MICROMAX I

MINI BOOK

M I C R O M A X I

M I N I B O O K

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Engineering Training Section

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MICROMAX I

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ERRATUM

Page 3 9.0 BDPROM PROGRESS CODES

A - should read

A - Port 0 USART and baud rate generator initialised

Note that there is no CPU instruction verification.

Page 4 9.1 BDPROM PROGRESS CODES

Letter 'I' appears twice;

The second 'I' should be:

'K' - SLOAD I CRC verified.

8.0 & 8.1 BDPROM PROGRESS CODES

A - Port 0 USART amd baud rate generator initialised.
NOTE: 8.0 BDPROM verifies CPU instructions. CPU halts on failing instruction

B - Memory locations x'8000' to x'FFFF' verified.

C - Disk drive 0 ready

D - Real time clock verified

E - Disk Drive 0 restored to track 0 successfully

F - Seek track 1. Sectors 1 & 2 (upper head 0) read with no disk status errors.

G - Incrementing data pattern verified

H - Not used

I - Not used

J - Sectors 3 to 26 (SLOAD I) read. Seek track 76. Sectors 1 to 24 (SLOAD II) read. No disk status errors were detected.

K - SLOAD's CRC verified

SLOAD PROGRESS CODE

L - Memory locations x'0000' to x'7FFF' verified.

8.1B BDPROM PROGRESS CODES

A - Port 0 USART and baud rate generator initialised.

B - Memory locations x'8000' to x'FFFF' verified.

C - Disk drive 0 ready

D - Not used

E - Disk drive 0 stepped out four tracks restored to Track 0 successfully.

F - Seek Track 1. Sectors 1 & 2 (upper head 0) read with no disk status errors.

G - Incrementing data pattern verified

H - Not used

I - Not used

J - Check security access. Sectors 3 to 26 (SLOAD I) read. Seek track 76. Sectors 1 to 24 (SLOAD II) read. No disk status errors were detected.

K - SLOAD's CRC verified.

SLOAD PROGRESS CODE

L - Memory locations x'0000' to x'7FFF' verified.

9.0 BDPROM PROGRESS CODES

A - CPU instructions verified. CPU halts failing instruction. Port 0 USART and baud rate generator initialised.

B - Memory locations x'8000' to x'FFFF' verified.

C - Disk drive 0 ready

D - Real time clock verified

E - Disk drive 0 restored to track 0 successfully

F - Sectors 2 & 3 (lower head 1) read at single density with no disk status errors.

G - Incrementing data pattern verified

H - Sectors 4 to 26 on track 0 (SLOAD I) read with no disk status errors.

I - SLOAD I CRC verified.

SLOAD I PROGRESS CODES

L - Memory locations x'0000' to x'7FFF' verified.

M - Seek track 1. Sectors 1 to 26, lower head 1 (SLOAD II) read at double density with no disk status errors. SLOAD II CRC verified.

9.1 BDPROM PROGRESS CODES

A - Port 0 USART and baud rate generator initialised.

B - Memory locations x'8000' to x'FFFF' verified.

C - Disk drive 0 ready.

D - Not used

E - Disk drive 0 stepped out four tracks, restored to Track 0 successfully.

F - Sectors 2 & 3 (lower head 1) read at single density with no disk status errors.

G - Incrementing data pattern verified.

H - Not used

I - Not used

J - Check security access. Sectors 4 to 26 on Track 0 (SLOAD I) read with no disk status errors

I - SLOAD I CRC verified

SLOAD I PROGRESS CODES

L - Memory locations x'0000' to x'7FFF' verified.

M - Seek Track 1. Sectors 1 to 26, lower head 1 (SLOAD II) read at double density with no disk status errors. SLOAD II CRC verified.

DISK ERROR CODES FOR 8271 FDC SINGLE DENSITY

(IN HEX)

08	-	Clock error (missing flux change detected)
0A	-	Late DMA (DMA did not service FDC in time)
0C	-	ID Field CRC Error (header CRC mismatch)
0E	-	Data Field CRC Error
10	-	Drive Not Ready
12	-	W/Protect Status (Not used)
14	-	Track 0 not found
16	-	Write Fault (Not used)
18	-	Sector Not Found (Sector Format could not be identified)

For further information on Disk Error Codes, refer to relevant sections of the Intel Peripheral Design Handbook.

COMMAND SUMMARY

		BITS							
TYPE	COMMAND	7	6	5	4	3	2	1	0
I	Restore	0	0	0	0	h	V	r_1	r_0
I	Seek	0	0	0	1	h	V	r_1	r_0
I	Step	0	0	1	u	h	V	r_1	r_0
I	Step In	0	1	0	u	h	V	r_1	r_0
I	Step Out	0	1	1	u	h	V	r_1	r_0
II	Read Sector	1	0	0	m	X	E	0	0
II	Write Sector	1	0	1	m	X	E	X	a_0
III	Read Address	1	1	0	0	0	1	0	0
III	Read Track	1	1	1	0	0	1	0	X
III	Write Track	1	1	1	1	0	1	0	0
IV	Force Interrrupt	1	1	0	1	I_3	I_2	I_1	I_0

X = Don't care Note: Bits shown in TRUE form.

. FLAG SUMMARY

TYPE II

m = Multiple Record flag (Bit 4)

m = 0, Single Record
m = 1, Multiple Records

a_0 = Data Address Mark (Bit 0)

a_0 = 0, FB (Data Mark)
a_0 = 1, F8 (Deleted Data Mark)

E = 15 ms Delay

E = 1, 15 ms delay

E = 0, no 15 ms delay

FLAG SUMMARY

TYPE I

h = Head Load Flag (Bit 3)

h = 1, Load head at beginning
h = 0, Unload head at beginning

V = Verify flag (Bit 2)

V = 1, Verify on last track
V = 0, No verify

r_1r_0 = Stepping motor rate (Bits 1-0)

Refer to Table 1 for rate summary

u = Update flag (Bit 4)

u = 1, Update Track register
u = 0, No update

FLAG SUMMARY

TYPE IV

Ii = Interrupt Condition flags (Bits 3-0)

I0 = 1, Not-Ready to Ready Transition
I1 = 1, Ready to Not-Ready Transition
I2 = 1, Index Pulse
I3 = 1, Immediate Interrupt

DISK ERROR CODES FOR 1791 FDC DOUBLE DENSITY

TYPE I COMMANDS : seek operations

80	Drive not Ready
40	Write Protect (not used)
20	Head Loaded
10	Seek Error (desired track was not verified)
08	CRC Error (ID or Data Field)
04	Head located at Track 0
02	Index Mark detected
01	Busy (Controller busy status)

TYPE II AND III COMMANDS : read and write

(IN HEX)	
80	Drive not Ready
40	Write Protect (not used)
20	Record Type/Write Fault
10	Record not found (Desired track & sector were not found)
08	CRC Error (ID or Data Field)
04	Lost Data (Response to DRQ delayed)
02	Data Request (Copy of DRQ output)
01	Busy (Controller busy status)

For further information on Disk Error Codes, refer to 1791 Data Sheets in EB150.

COMMAND SUMMARY

COMMANDS	FIRST COMMAND BYTE								TOTAL BYTES
	7	6	5	4	3	2	1	0	
STATUS	0	0	0	0	M	M	M	M	1 byte
SEQUENCE	0	0	0	1	0	0	0		1 byte
REZERO	0	0	1	0	0	0	0	0	1 byte
SET SECTOR COUNT	0	0	1	1	0	0	0	0	2 bytes
SEEK	0	1	0	0	V	H	H	H	2 bytes
NOT USED	0	1	0	1	0	0	0	0	
NOT USED	0	1	1	0	0	0	0	0	
NOT USED	0	1	1	1	0	0	0	0	
DIAGNOSE	1	0	0	0	0	0	0	0	2 bytes
WRITE DATA	1	0	0	1	V	G	0	0	2 bytes
READ DATA	1	0	1	0	V	0	0	0	2 bytes
FORMAT	1	0	1	1	0	G	M	M	1 byte
WRITE BUFFER	1	1	0	0	0	0	0	0	1 byte + data
READ BUFFER	1	1	0	1	0	0	0	0	1 byte + data
I/O PORT SELECT	1	1	1	0	M	M	M	M	1 byte
IPL (BOOT)	1	1	1	1	0	0	0	0	1 byte + data

M = Modifier
u/d = 0 = up, 1 = down
V = 1 = Verify
H = Head Address
G = Guarded track flag

MARKSMAN HARD DISK

STATUS BYTES

STATUS 0, CONTROL STATUS

Status 0 is the ending status which the controller returns to the host CPU after completing a command.

Bit 0

Bit 1

Bit 2

Bit 3 ILLEGAL COMMAND : An unused or reserved command was issued.

Bit 4 RETRY : After the seek operation in a seek-verify command, an ID field is read to verify the correct cylinder. If a parity error is found in this ID field, the retry bit is set. One retry is then attempted by reading the next ID field the retry bit is set. One retry is then attempted by reading the next ID field. If the retry is not successful, the error bit (bit 7) is also set in status 0.

Bit 5 WRITE ENABLED : WRTENB dip switch is open (switch S1, position 8, on controller electronics).

Bit 6 ABORTED : Drive responded to the abort tag line from the user. The drive will be reset and status 0 will be returned to the user.

Bit 7 ERROR : An error condition existed on the last command issued by the user. The error is further defined in status 1.

STATUS 1, CONTROL STATUS

Bit 0 SEEK ERROR : This bit is set if on a seek-verify, the ID did not match the expected ID.

Bit 1 GUARD ERROR : An attempt was made to do an unguarded write on a guarded track, or a guarded write on an unguarded track.

Bit 2 DATA ERROR : A CRC error was detected on a read data operation; or a write-verify or read verify bit error was detected.

Bit 3 ID CHECK-CODE ERROR : On a read data, write data or seek-verify operation, the ID parity byte did not match the expected byte.

Bit 4 ID NOT FOUND : On a read data or write data operation, the target ID could not be located within two revolutions of the disk.

Bit 5 DEFECTIVE TRACK : After a seek without verifying, an attempt was made to read or write on a track formatted as a defective track.

Bit 6 WRITE ERROR : On a write data command, the WRTENB switch (switch S1, position 8, on controller electronics) was closed, or write unsafe was detected from the drive.

Bit 7 DRIVE ERROR : An error occurred in the drive and is further defined in status 2, 9 through F.

STATUS 2, UNIT STATUS

Bit 0 TRACK ZERO : Heads are located over track zero.

Bit 1 LANDING ZONE : Heads are located over the landing zone.

Bit 2 ILLEGAL COMMAND

Bit 3 READY : The disk is up to rotational speed.

Bit 4 SPIN ACCELERATION/DECLERATION OUT OF LIMITS.

Bit 5 END OF CYLINDER.

Bit 6 DIAGNOSTIC ERROR.

Bit 7 TRACK 0 ERROR.

ERROR MESSAGES FROM 8.1B & 9.1 FIRMWARE

1. "DRIVE NOT READY"

Drive 0 is not ready. Possible causes are:

(a) No diskette inserted

(b) Aperture door not closed

(c) Diskette inserted incorrectly

(d) System fault: (i) Loss of power to drive 0

(ii) Broken belt on drive 0

2. "DISK ERROR - XX"

An error was detected by the FDC while reading the diskette in Drive F0. 'XX' indicates the Error Code for the relevant FDC. Error Codes are listed on pages 5 and 7.

(Note: 9.1 firmware Error Codes are given only from Type II & III Commands).

Possible causes are:

(a) Worn or damaged diskette (use UTD diagnostic or copy utility to verify)

(b) Diskette is not initialised

(c) Diskette initialisation format incompatible

(d) Diskette written by misaligned drive

(e) System fault (i) Drive 0

(ii) Double Density Controller

(iii) Single Board Computer

3. "NO OPERATING-SYSTEM"

Two sectors were read from disk without error, but the data was not the incrementing data pattern, 0 to 254 that indicates that the diskette contains an operating-system boot.

Possible causes are:

(a) Incorrect diskette

(b) System fault - Single board computer

4. "MEM ERROR AAAA WW RR"

A memory error was found at location AAAA (x'8000' to x'FFFF'). Data written was WW but data read was RR.

When a memory error is detected, a '#' is output after BDPROM progress code letter 'A' (without using RAM) and then the above message is output. A total RAM failure results in only a '#' message.

5. "NOT ALLOWED"

The access protection feature is enabled. The customer cannot boot this diskette. If an engineer wishes to run diagnostics on a machine using access protection, he must use the override sequence.

ERROR MESSAGES FROM SLOAD

The BDPROM firmware reads from disk and verifies a program called the STARDOS loader (abbreviated to SLOAD).

SLOAD can display the following error messages:

1. ERROR AAAA WW RR

   A memory error was found at location AAAA (x'0000' to x'7FFF'). Data written was WW but data read was RR.

2. DISK ERROR ON DRIVE FX, SIDE X, ERROR CODE IS XX; TRACK IS XX, SECTOR IS XX, HIT RETURN TO IGNORE ERROR, ANY OTHER KEY TO ABORT.

   The disk system failed to seek or read. Disk error codes are listed on pages 5 & 7.

3. VERIFY ERROR AT TRACK XX
   BYTE WRITTEN = YY
   BYTE READ = ZZ
   HIT RETURN TO TRY AGAIN, ANY OTHER KEY TO ABORT COPY.

   A verify operation occurs with the following system utilities:

   (a) Initialise diskette
   (b) Copy Boot
   (c) Copy diskette

   The operation comprises:

   (a) write one track
   (b) read the same track to a memory buffer
   (c) do a memory compare byte by byte

4. CRC ERROR ON LOADING BASIC, HIT RETURN TO IGNORE.

   This message indicates a CRC error was detected after the STARDOS operating system was read from disk.

ERROR CODES FROM STARDOS OPERATING SYSTEM

The STARDOS Operating System has an extensive fault monitoring system mainly for the detection of programming errors. A full list of all possible error conditions is given on pages 15 to 17.

Some errors are of particular significance to the Engineer:-

1. *ERROR 112 - DEVICE NOT READY

This error usually occurs when a print operation is attempted and the printer is not ready. Check you printer for:-

(a) Out of Paper

(b) Out of Ribbon

(c) Covers Open

(d) Fault Condition

(e) Off-Line Condition

This error will not occur if the printer is switched off or disconnected.

2. *ERROR 113 -
UNABLE TO READ FROM DISK
*ERROR 118 -

The diskette being accessed cannot be read. The red activity lamp on the diskette drive will indicate which diskette is faulty.

ERROR CODES FROM STARDOS

WARNING - BASIC

1	OVERFLOW
2	UNDERFLOW
3	DIVIDE BY ZERO
10	CLEAR VARIABLE NOT FOUND
20	ILLEGAL TYPE FOR THIS OPERATION
21	ILLEGAL VALUE FOR THIS OPERATION
22	ILLEGAL TYPE IN FUNCTION CALL
23	ILLEGAL VALUE IN FUNCTION CALL

WARNING - I/O

80	FEWER DATA ITEMS THAN SPECIFIED IN AN INPUT STATEMENT
81	MORE DATA ITEMS THAN SPECIFIED IN AN INPUT STATEMENT
82	BAD CHARACTER IN INPUT DATA - QUOTED STRING OR NUMERIC NOT FOLLOWED BY A COMMA

RECOVERABLE I/O

100	DATA TO WRITE OR PRINT IS LARGER THAN RECORD SIZE
101	DATA MISMATCH IN INPUT OR READ
102	DATA LIST EXHAUSTED
103	BAD FILE OR DEVICE NAME IN OPEN
104	BAD SYNTAX IN I/O STATEMENT
105	A FILE IS ALREADY OPEN USING THIS NUMBER
106	BAD FILE NUMBER
107	NOT CONFIGURED FOR BACKGROUND
108	BACKGROUND BUSY
111	SYSTEM ERROR - OPERATION IN PROGRESS WHEN ATTEMPTING A NEW ONE
112	DEVICE NOT READY
113	ABLE TO READ ID BUT UNABLE TO READ THE DATA SECTOR
114	SYSTEM ERROR - INVALID DATA IN DCB ON CALL TO DRIVER
118	UNABLE TO READ SECTOR ID FOR SPECIFIED OPERATION
119	DELETED DATA SECTOR FOUND IN ATTEMPTING DISK OPERATION
120	USER SPECIFIED OPERATION IS INVALID FOR THIS FILE
121	INVALID RRN FOUND IN EXECUTING OPERATION
122	ATTEMPTING TO WRITE AN UPDATE RECORD WITHOUT FIRST READING IT
123	END OF FILE PROCESSED SEQUENTIALLY BY KEY OR CONSECUTIVELY
124	KEY NOT FOUND FOR RANDOM READ

125 DATA PORTION IN INDEXED FILE IS FULL
126 NO EMPTY SECTORS LEFT IN INDEX SPACE FOR OVERFLOW
OR EXTENSION RECORDS
127 DEVICE SPECIFIED IS NOT ON SYSTEM
128 DEVICE SPECIFIED IS NOT CURRENTLY OPERATIONAL
129 DEVICE SPECIFIED IS CURRENTLY IN USE
130 INSUFFICIENT GENERAL USE SPACE IS AVAILABLE FOR THIS
OPERATION AT THIS TIME
131 FILE TO BE OPENED DOES NOT EXIST ON THE SPECIFIED DEVICE
132 SYSTEM ERROR - THE I/O OPERATION TO BE PERFORMED CANNOT
BE DECODED
133 INVALID OR INCONSISTENT MODE OF PROCESSING OR FILE TYPE
SPECIFICATION
134 USER SPACE INSUFFICIENT FOR OPERATION
135 KEY SPECIFIED FOR WRITE TO 'EXTEND' THE FILE DOES NOT EXCEED ALL
KEYS IN THE FILE
136 KEY LENGTH OF SUPPLIED KEY DOES NOT MATCH KEY LENGTH OF
FILE
137 ATTEMPTING TO ADD A RECORD TO THE FILE WHOSE KEY MATCHED ONE
ALREADY THERE
138 ATTEMPTING TO CLEAR A SEQUENTIAL FILE ALREADY OPENED FOR
INPUT OR UPDATE
139 SPACE ALLOCATED TO THIS FILE HAS BEEN EXHAUSTED
140 ATTEMPTING TO OPEN AN EMPTY INDEXED FILE FOR EITHER
INPUT OR UPDATE
141 'POSITION' SPECIFICATION IS TOO GREAT FOR THIS FILE
142 ATTEMPTING TO READ FROM OR WRITE TO A SECTOR BEING USED
BY ANOTHER FILE
143 FILE LOCKED BY ANOTHER USER
144 ACCESS TO FILE NOT ALLOWED

TERMINAL I/O ERRORS

160 SYSTEM ERROR - PROBLEMS WITH SYSTEM TABLES

161 NO FILE OPEN FOR THIS NUMBER
162 BAD FILE NAME
163 BAD DEVICE NAME
164 BAD FILE NUMBER
165 OPERATION ILLEGAL FOR THIS FILE
166 OPEN SYNTAX IS UNRECOGNIZABLE

TERMINAL BASIC ERRORS

200 NOT LOGGED ON
201 ALREADY LOGGED ON
202 BAD USER ID
205 NO MATCHING DELIMETER (BRACKET, PARENTHESIS, OR QUOTE)
206 RIGHT PARENTHESIS IS UNMATCHED
207 RIGHT BRACKET IS UNMATCHED
208 ILLEGAL VARIABLE NAME

209 ILLEGAL OPERATION

210 ILLEGAL CHARACTER IN LIST OF ARGUMENTS
211 ILLEGAL SYNTAX IN FOR OR NEXT
212 ILLEGAL KEYWORD OR KEY CHARACTER
213 ILLEGAL VERB
214 VERB NOT VALID IN CURRENT MODE
215 VERB, KEYWORD, OPERATION, OR SYNTAX IS NOT VALID IN CURRENT VERSION

220 ILLEGAL TYPE FOR THIS OPERATION
221 ILLEGAL VALUE FOR THIS OPERATION
222 ILLEGAL TYPE IN FUNCTION CALL
223 ILLEGAL VALUE IN FUCTION CALL

225 PSEUDO STACK OVERFLOW
226 GOSUB STACK OVERFLOW
227 RETURN WITH NO CORRESPONDING GOSUB
228 ILLEGAL LINE NUMBER OR LINE NUMBER NOT FOUND
229 FOR WITHOUT NEXT OR NEXT WITHOUT FOR
230 IF WITHOUT THEN

235 ARRAY, USER FUNCTION, OR STRING WAS ALREADY DEFINED
236 USER FUNCTION HAS NOT BEEN DEFINED
237 INCORRECT NUMBER OF ARGUMENTS IN A FUNCTION CALL
238 INCORRECT NUMBER OF SUBSCRIPTS IN AN ARRAY REFERENCE
239 SUBSCRIPT OUT OF RANGE

250 USER MEMORY SPACE EXHAUSTED
251 SYSTEM ERROR-SYMBOL TABLE PROBLEMS

ERROR MESSAGES FROM CP/M

There are three error messages from CP/M. They are:-

1. BDOS ERR ON X : BAD SECTOR

   where X is the drive name

This message indicates the disk system failed to seek, read or write. Possible causes are:

   (a) Worn or damaged diskette

   (b) Diskette written by misaligned drive

   (c) System fault

The user has two choices to recover:

   (a) Abort - type Control-C

   (b) Ignore error - type Return

2. BDOS ERR ON X:SELECT

   where X is the drive name

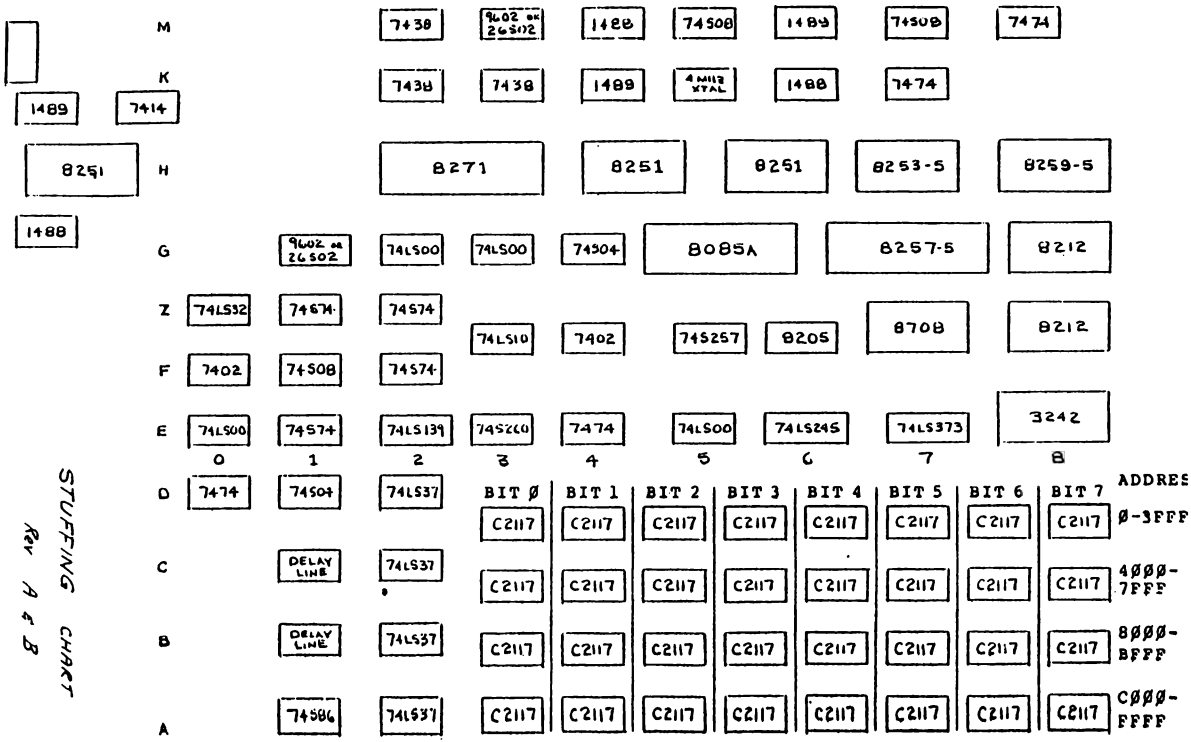
This error occurs when there is an attempt to address a drive beyond the A through D range. The system reboots following any input.

3. BDOS ERR ON X : READ ONLY

   where X is the drive name

This error occurs when there is an attempt to write to a diskette which has been designated as read-only in a STAT command, or has been set to read-only by the Operating System.

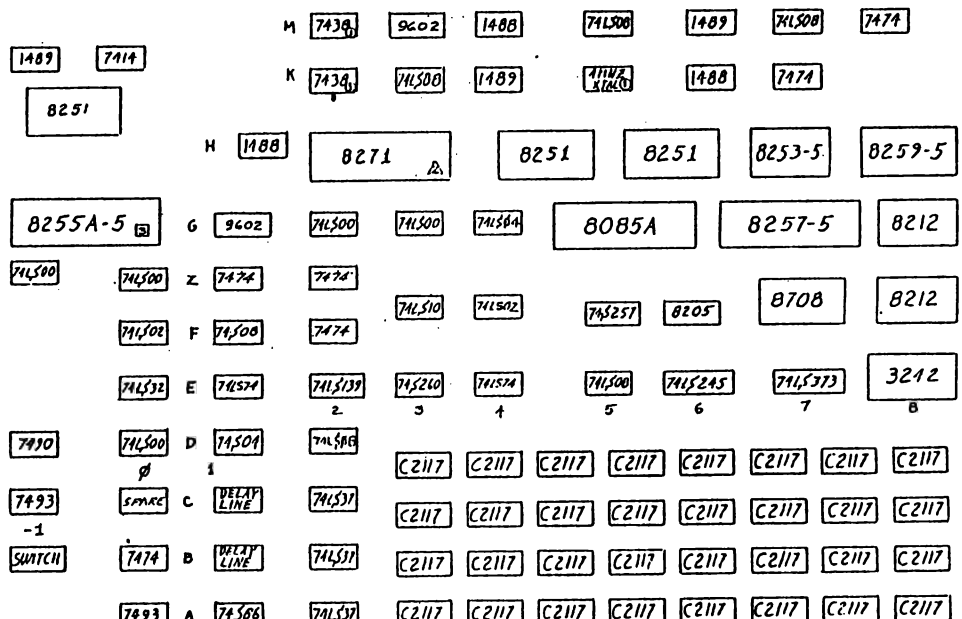
The user should reboot by typing Control-C.



STUFFING CHART

Rev A & B

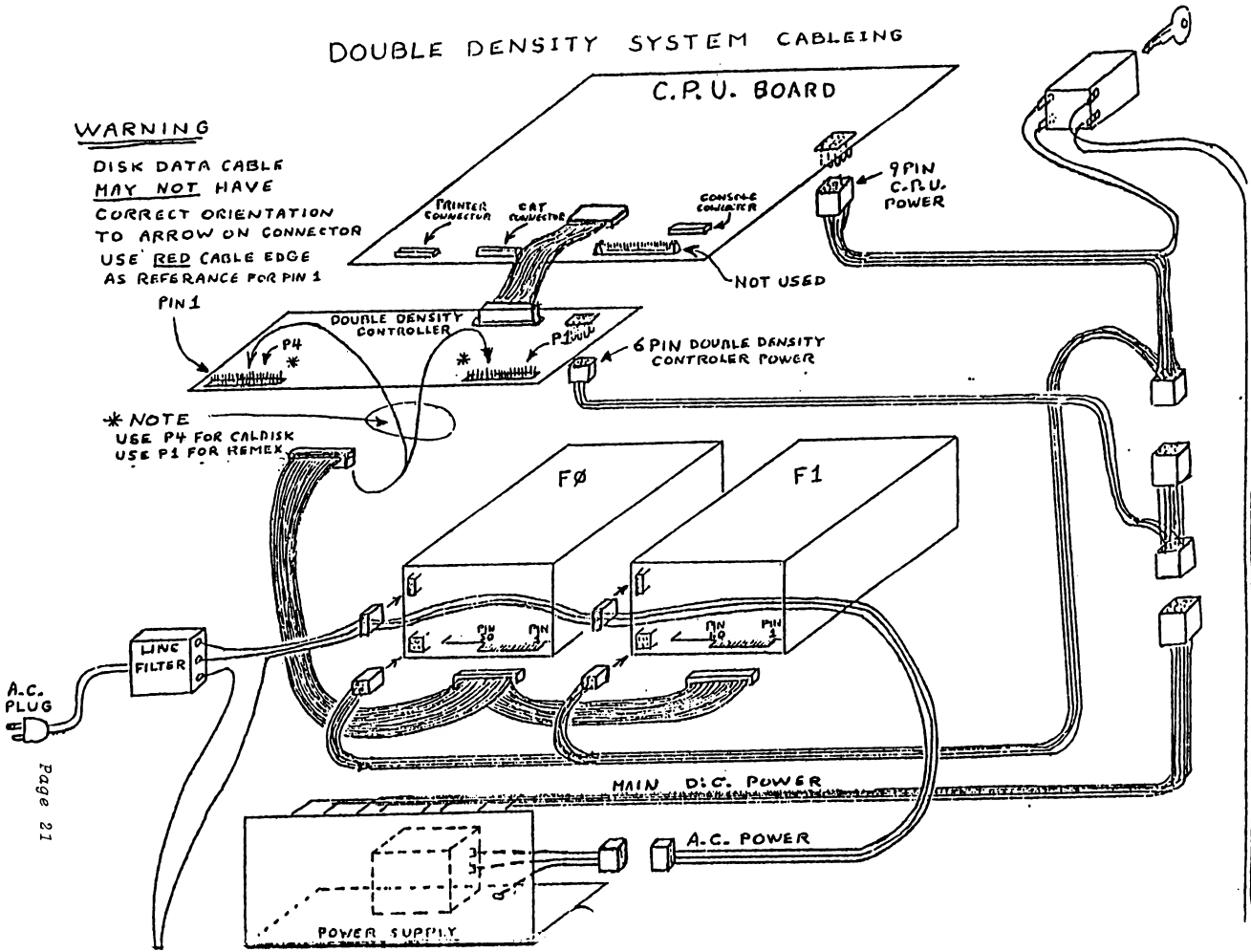
① INSTALL ASSY. A151 AT THESE LOCATIONS FOR OPTIONS #1 AND #2
⚠ DO NOT INSTALL 8271 AT THIS LOCATION FOR " " " "
3 INSTALL IC 8255A-5 AT THIS LOCATION FOR OPTIONS #2 AND #3 ONLY.



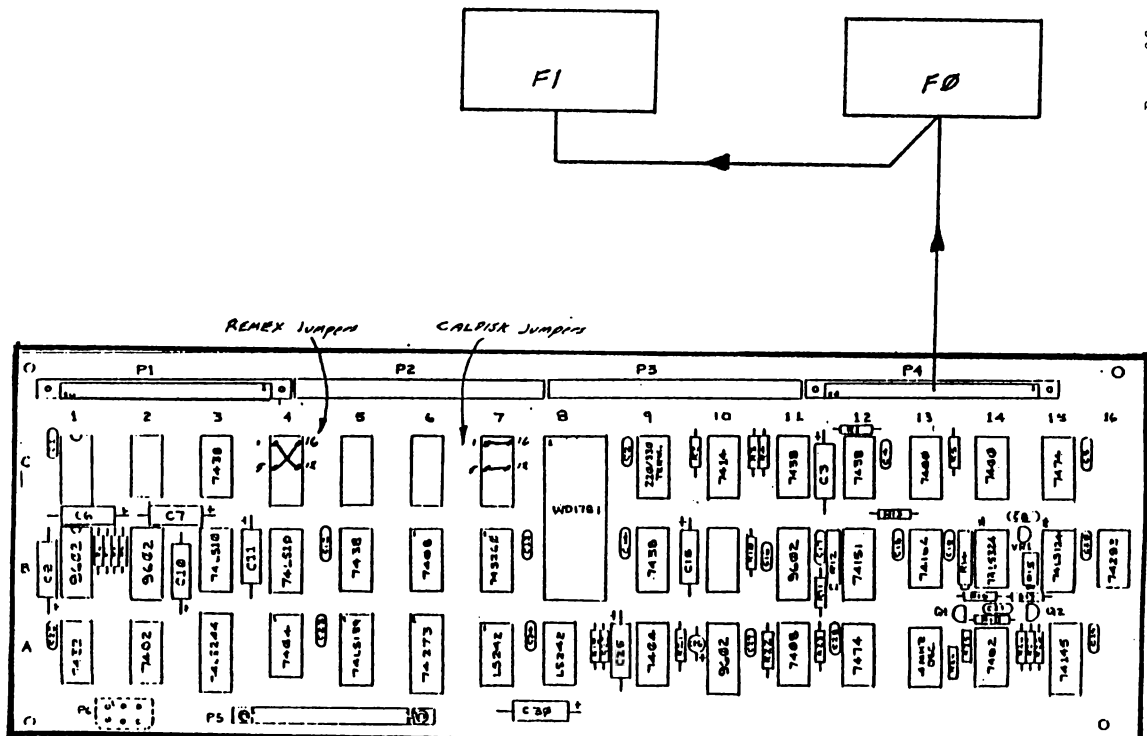
STUFFING CHART

Rev C

SIZE D	MICRO V	DRAWING NO. ASA 122	REV C
SCALE: N/A	DATE 7/82	SHEET 2 OF 2.	

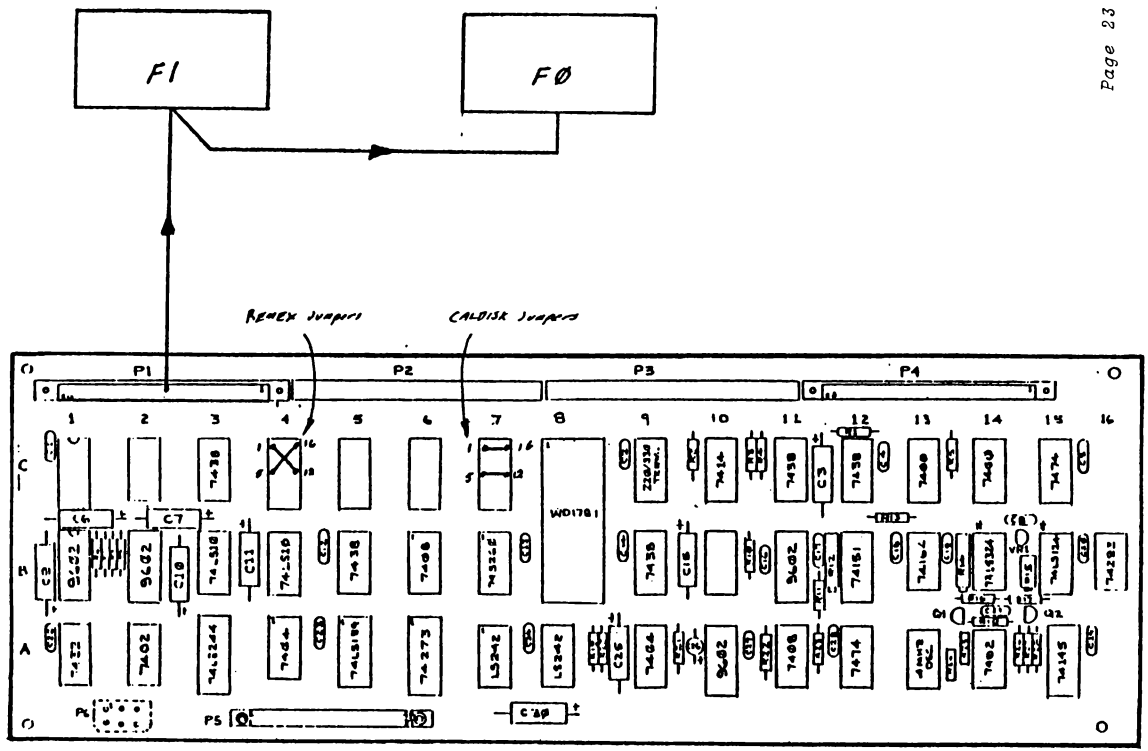

DOUBLE DENSITY SYSTEM CABLEING
C.P.U. BOARD
WARNING
DISK DATA CABLE
MAY NOT HAVE
CORRECT ORIENTATION
TO ARROW ON CONNECTOR
USE RED CABLE EDGE
AS REFERANCE FOR PIN 1
PRINTER CONNECTOR
CRT CONNECTOR
CONSOLE CONNECTOR
NOT USED
9 PIN C.P.U. POWER
PIN 1
DOUBLE DENSITY CONTROLLER
P4
P1
6 PIN DOUBLE DENSITY CONTROLER POWER
* NOTE
USE P4 FOR CALDISK
USE P1 FOR REMEX
FØ
F1
LINE FILTER
A.C. PLUG
MAIN D.C. POWER
A.C. POWER
POWER SUPPLY

CALDISK CABLING



* ONLY ONE OF THESE I.C.S IS INSTALLED, AS D[illegible] BY AVAILABILITY.

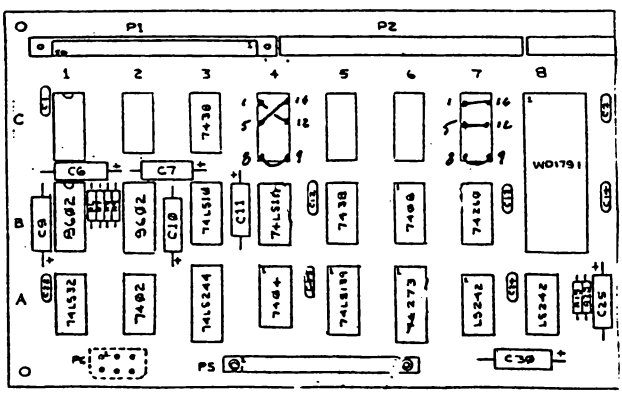
REMEX CABLING



$ ONLY ONE OF THESE I.C'S IS INSTALLED, AS D[illegible]MINED BY AVAILABILITY.

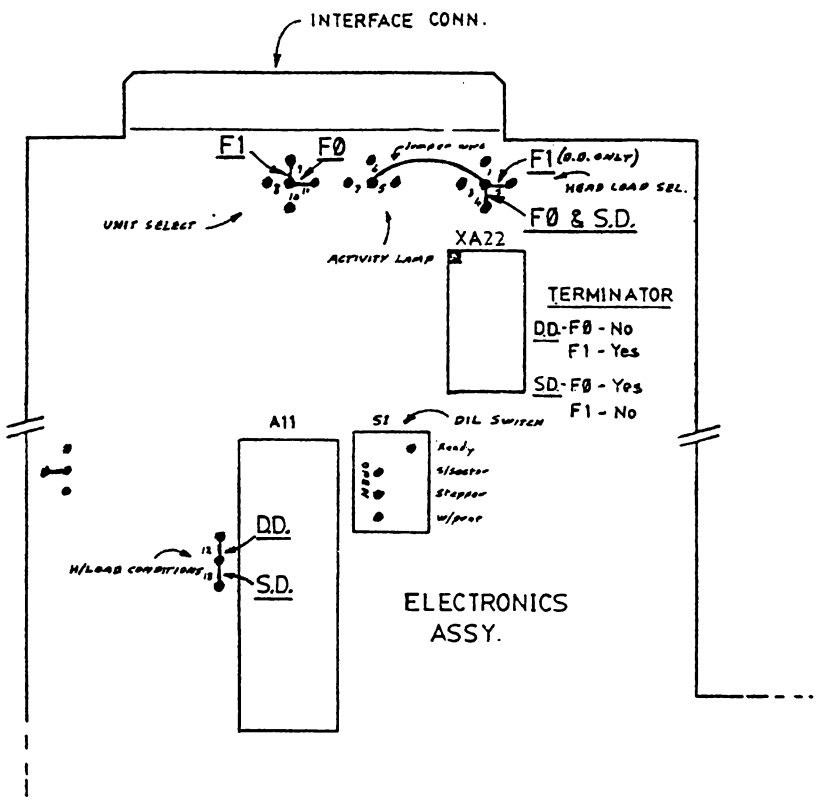
DOUBLE DENSITY CONTROLLER JUMPERS

REFER EB 222



CALDISK FLOPPY - OPTION JUMPERS

- COVERING SINGLE & DOUBLE DENSITY CONFIGURATIONS



CALDISK JUMPERS

1. SINGLE/DOUBLE DENSITY CHANGEOVER

Designation	Description	S.D.	D.D.
JPR4	Standard H/load	Jumpered	(See DD F0/F1)
JPR2	Alternate H/load	Open	(See DD F0/F1)
JPR12	H/load ungated	Open	Jumpered
JPR13	H/load from Select	Jumpered	Open
XA22	Terminator Network	in F0	in F1

2. F0/F1 CHANGEOVER

Designation	Description	F0	F1
XA22	Terminator Network	(see SD/DD above)	
JPR11	Drive Select 0	Jumpered	Open
JPR9	Drive Select 1	Open	Jumpered

Double Density Only

JPR4	Standard H/load	Jumpered	Open
JPR2	Alternate H/load	Open	Jumpered

CALDISK JUMPERS continued:

3. FULL JUMPER LIST (excludes F0/F1 and SD/DD jumpers - page 26)

Designation	Description	Open/Jumpered
JPR1	Head Load 3	Open
JPR3	Head Load 4	Open
JPR5	Activity Lamp from 'W/Prot'	Open
JPR6	Activity Lamp from 'In use'	Open
JPR7	Activity Lamp from 'Select'	Open
JPR8	Select 3	Open
JPR10	Select 4	Open
JPR14	32 Hard Sectors	Don't Care
JPR15	16 Hard Sectors	Don't Care
JPR16	8 Hard Sectors	Don't Care

- DIL Switch

A	Ready depends on Select	Closed
B	Soft Sector	Open
C	Stepper power enabled	Open
D	W/Prot depends on Select	Open

REMEX JUMPERS

1. Single/Double Density Jumpers:

Designation	Description	S.D.	D.D.
C(7A)	Standard H/load	Jumpered	(See D.D. F0/F1)
D(7A)	Alternate H/load	Open	(See D.D. F0/F1)
X(5E)	H/load from Select	Open	Jumpered
B(5E)	H/load from Select	Jumpered	Open

2. F0 and F1 Jumpers

Designation	Description	F0	F1
(7A)	Terminator Network	No	Yes
DS1(8A)	Drive Select 0	Jumpered	Open
DS2(8A)	Drive Select 1	Open	Jumpered

Double Density only:

C(7A)	Standard H/L	Jumpered	Open
D(7A)	Alternate H/L	Open	Jumpered

NOTE - This jumper list applies only for a fully modified drive.

3. Full Jumper List

Designation	Description	Open/Jumpered
1B	Side Select	Open
2B	Using Option	Open
3B	Select	Open
4B		Open
RR	Radial Ready	Jumpered
RI	Radial Index	Jumpered

REMEX JUMPERS Continued

Designation	Description	Open/Jumpered	
R(5E)	Ready Option	Jumpered	
2S	2-Side Status	Jumpered	
4000/4001	Sector Option	4000 Jumpered	
I(5E)	Index Output	Jumpered	
S(5E)	Sector Output	Jumpered	
DC	Disc Change	Open	
DS	Stepper en from DS	Open	
WP	Write Protect Option	Jumpered	
NP	Disable W/Protect	Open	
DL	Door Locked on Select	Open	
HL	Head Load enables Stepper	Open	
A(5E)	Radial Head Load	Jumpered	
Y	A/Lamp from Head Load	Jumpered	
Z(5E)	A/Lamp from Drive Sel.	Open	
S1	Side Sel. using Dir. Sel.	Open	
S2	Std. Side Sel.	Jumpered	
S3	Side Sel. using D/Sel	Open	
TS	True Separation	Jumpered	
FS	False Separation	Open	
		*	#
-5V	-5V Supply Option	Open	Jumpered
-15V	-15V Supply Option	Jumpered	Open

* 'Power components' supply fitted
\# 'Microcomputer Power' supply fitted.

POWER DISTRIBUTION HARNESS COLOUR CODES

(i) D.C. Group

+ 5V	Red
+24V	Orange
+12V	Grey
-12V	Violet
- 5V	Brown
0V	Black
-15V	Yellow *

* Only fitted to supplies with 15V regulator.
It is only used for Remex Floppy Drives.

(ii) A.C. Group

240V A.C. @ 50 Hz	White and Black associated with A.C. Harness
Mains Earth	Green

'POWER COMPONENTS' SUPPLY UTILISATION

VOLTAGE		DEVICE	I-CAPACITY
+ 5		S.B.C.	4A
		Floppy Drive	1A (each)
+24		Floppy Drive	1.5A each (max)
+12		Memory RS232 Interface }	1.2A
-12	*1	RS232 Interface	1A
- 5		Memory	0.2A
-15	*2	Remex Floppy Drive only	1.2A

NOTE:

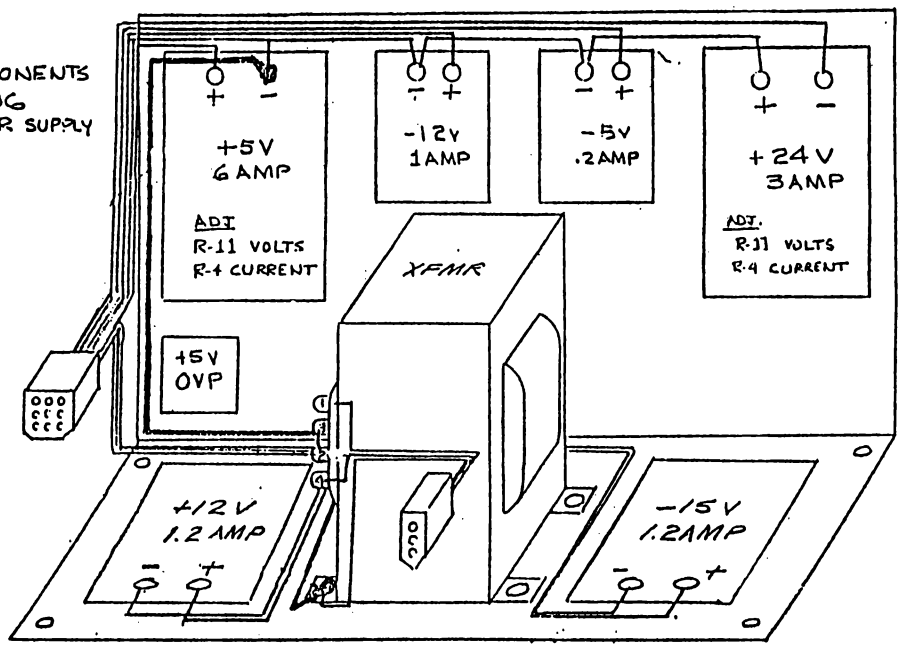
*1 This regulator also supplies Remex Floppy drives when the -15V regulator is absent.

*2 This -15V regulator is not fitted to all power supplies.

'MICROCOMPUTER POWER' SUPPLY UTILISATION

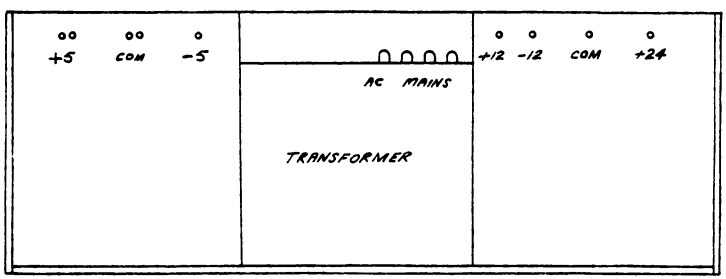
VOLTAGE	DEVICE	I-CAPACITY
+ 5	S.B.C.	6A
	Floppy Drive	1A each
+24	Floppy Drive	2.5A total
+12	Memory RS232 Interface }	1.2A
-12	RS232 Interface	0.5A
- 5	Memory Remex Floppy Drive only }	3A

POWER COMPONENTS
MODEL C686
LINEAR POWER SUPPLY



'MICROCOMPUTER POWER' SUPPLY LAYOUT

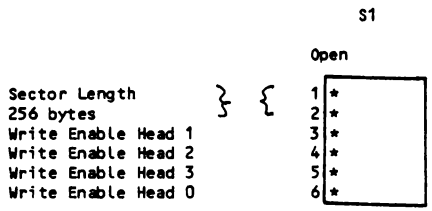
MODEL CP 140 FIXED DISK SERIES



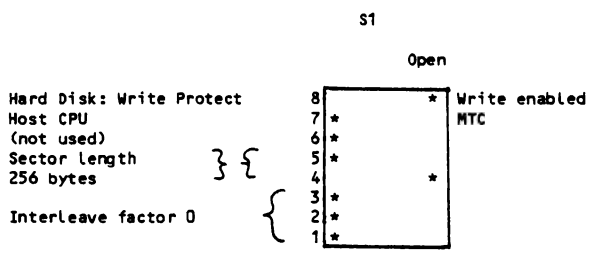
MARKSMAN HARD DISK

SWITCH SETTINGS (viewed from cabinet rear)

Basic Control PCB



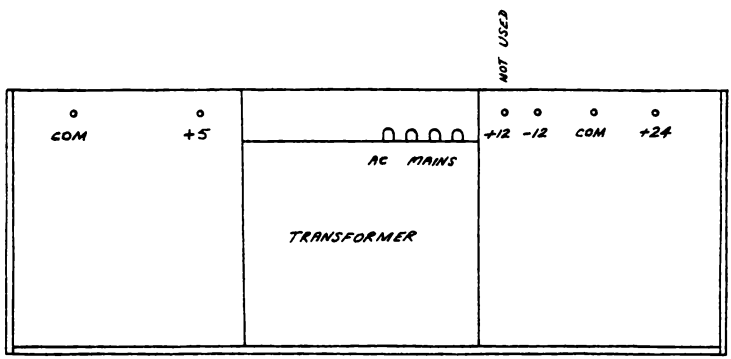
Marksman Controller PCB



MARKSMAN HARD DISK

'MICROCOMPUTER POWER' SUPPLY LAYOUT

MODEL CP 139 FIXED DISK SERIES



ADM-3A VIDEO TERMINAL SWITCH SETTINGS

* = Switch down on that side
X = Dont care

i) Switches Under Cover Plate

	on	off	
Bit 8-0	*		1
Parity -		*	Inh
Stop-1	*		2
Data - 7		*	8
Par-odd	X		Even
LC En	*		UC
Auto NL	*		Off
RS 232	*		CL
HDX		*	FDX
19200		*	
9600	*		
4800		*	B
2400		*	A
1800		*	U
1200		*	D
600		*	
300		*	R
150		*	A
110		*	T
75		*	E

ii) Switches at rear of Printed Circuit Board

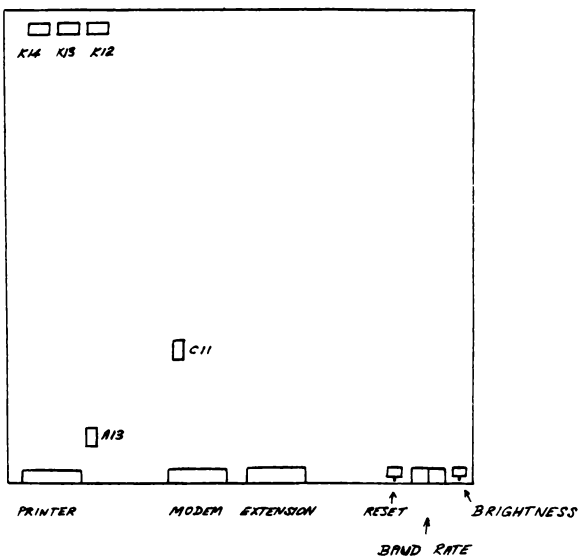
LOCATION 7A:-

Space	*		Adv.
UC disp		*	U/L dispq
Disable		*	Keybd Lock
Disable		*	Clear Screen
50 Hz	*		60 Hz
12 line		*	24 line

LOCATION 11A:-

Cur Ctl	*		Off
Local		*	Off
103	*		Off
202		*	Off
Code	X		Sec
ETX		*	Off
EOT		*	Off

ADM31 VIDEO TERMINAL LAYOUT



ADM-31 Video Terminal

Recommended Switch Settings
(for terminals with PCB P/N 129870-9)

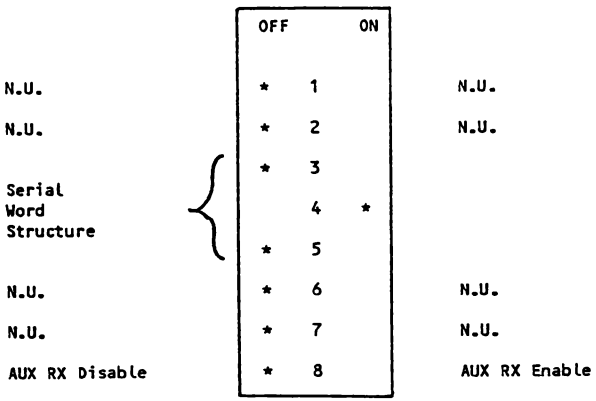
Switch Bank at C 11

	OFF		ON	
RS232C Disabled		1	*	RS232 Enabled
Direct Connect Disabled	*	2		Direct Connect Enabled
Current Loop Disabled		3	*	Current Loop Enabled
Direct Connect Rx Disabled	*	4		Direct Connect Rx Enabled
Dot Stretch Disabled	*	5		Dot Stretch Enable
Underline Enabled		6	*	Blank Enable
Display Null as Space	*	7		Display Null as Null

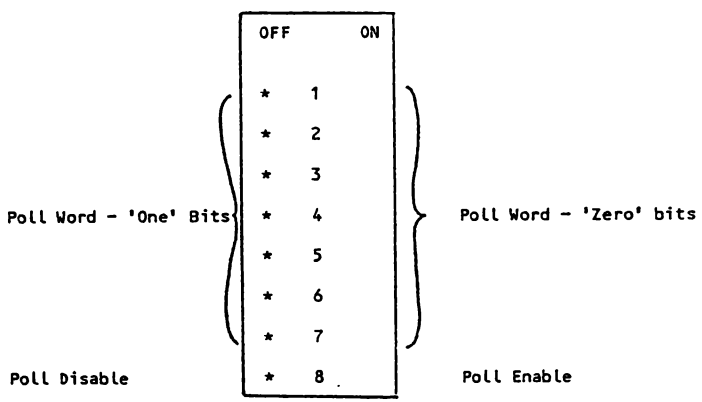
Switch Bank at K12

	OFF		ON	
Break Disabled		1	*	Break Enabled
60Hz		2	*	50Hz
Serial Word Structure	*	3		
		4	*	
	*	5		
N.U.	*	6		N.U.
Conversational	*	7		Block Mode
Half Duplex		8	*	Full Duplex

Switch Bank at K13



Switch Bank at K14

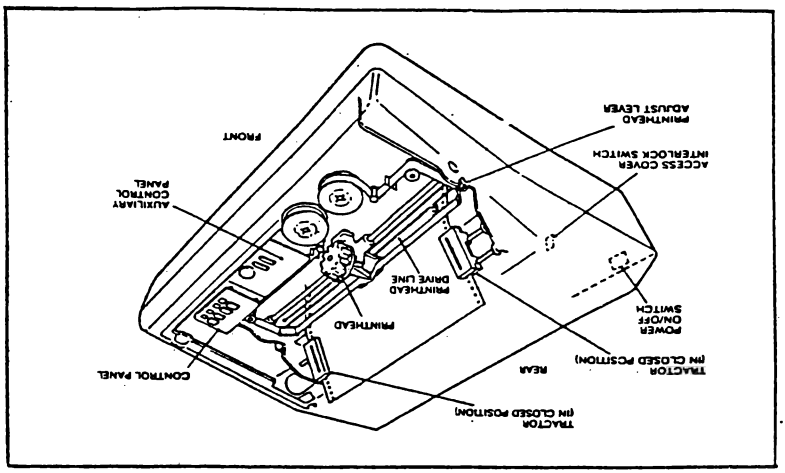


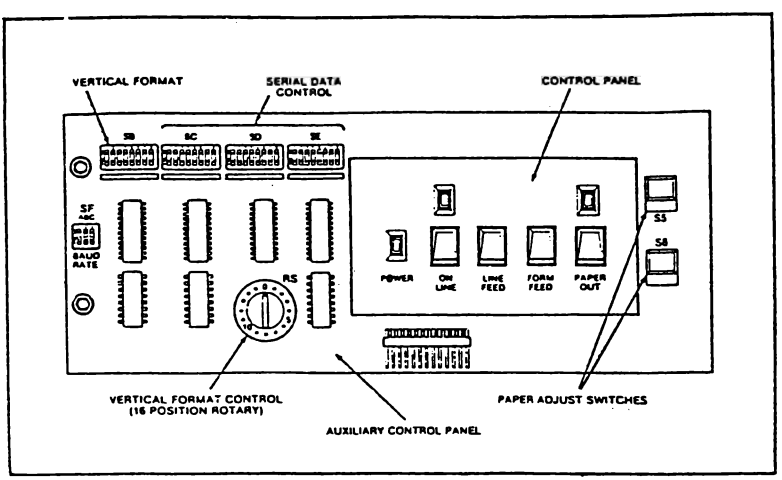
Switch Bank at A13

	OFF		ON	
		1	*	
Printer Busy Configuration	*	2		
	*	3		
I-Loop Disable	*	4		I-Loop Enable
SCF Disable		5	*	SCF Enable
BUSY		6	*	BUSY/
Blinking Cursor		7	*	Steady Cursor
Disable Attr. Displ.	*	8		Display Attr. Codes

BAUD RATE SELECT

Setting	Baud Rate
0	50
1	75
2	110
3	134.5
4	150
5	300
6	600
7	1200
8	1800
9	2000
10	2400
11	3600
12	4800
13	7200
14	9600
15	19200


FRONT
PRINTHEAD ADJUST LEVER
ACCESS COVER INTERLOCK SWITCH
AUXILIARY CONTROL PANEL
PRINTHEAD DRIVE LINE
POWER ON/OFF SWITCH
PRINTHEAD
TRACTOR (IN CLOSED POSITION)
REAR
CONTROL PANEL
TRACTOR (IN CLOSED POSITION)


VERTICAL FORMAT
SERIAL DATA CONTROL
CONTROL PANEL
SB
SC
SD
SE
SF
SG
BAUD RATE
RS
S1
S8
POWER
ON LINE
LINE FEED
FORM FEED
PAPER OUT
VERTICAL FORMAT CONTROL (16 POSITION ROTARY)
PAPER ADJUST SWITCHES
AUXILIARY CONTROL PANEL

LSI-310 SWITCH SETTINGS

1. VERTICAL FORMAT SWITCH, S8

Switch	Position	Function
1	ON	No auto new line at Right margin.
2	ON	No auto CR on LF, FF or VT.
3	ON	No auto LF on CR.
4	ON	No Automatic perforation skip.
5	OFF	(No Function).
6	OFF	Single Space.
7	OFF	6 lines/inch.
8	ON	Reinitialise data format at power-up.

2. SERIAL DATA CONTROL SWITCH, SC

Switch	Position	Function
1	ON	Serial Port Enable.
2	OFF	No Parity.
3	OFF	No substitution character on Parity Error.
4	OFF	Parity odd/even.
5	OFF	Full Duplex.
6	OFF	One Stop Bit.
7	ON	Auto on-line at power up.
8	OFF	Select primary font.

3. SERIAL DATA CHARACTER CONTROL SWITCHES SD & SE

Facility not used - all switches should be off.

4. BAUD RATE CONTROL, SF

Standard rate for operation with MicroStar is 9600 Baud.

BAUD RATE	PENCIL SWITCH POLES		
	A	B	C
* 9600	ON	ON	ON
4800	OFF	ON	ON
2400	ON	OFF	ON
1200	OFF	OFF	ON
600	ON	ON	OFF
300	OFF	ON	OFF
110	ON	OFF	OFF
75	OFF	OFF	OFF

DIGITAL CONTROL LOGIC PCB

Remove 4 screws securing the cover and remove the cover. BEWARE OF THE TWO WIRES LEADING TO THE COVER SWITCH. Remove the rearmost PCB (labelled 'digital control logic') and set switch S1 as follows:

Switch S1

Switch	Position	Function
1	OFF	
2	OFF	Select Tx clock from internal rate generator.
3	ON	
4	ON	Select Rx clock from internal rate generator.
5	OFF	
6	ON	Rx Data from RS232C interface.
7	OFF	
8	ON	CTS from RS232C interface.
9	OFF	
10	X	
11	OFF	BUSY = low
12	ON	

1. Adjusting Paper

The LSI - 310 has no paperfeed knob. Instead, two pushbuttons to the right of the control panel (accessable with the cover open) are used to adjust the paper up and down to centre the print head on the paper line.

2. Vertical Format Control Rotary Switch

The method of establishing a vertical format using this switch may not be immediately obvious.

When the rotary switch is in any position except zero, the 'Form Feed' and 'On Line' switches cease to perform their labelled functions, and instead become 'Enter' keys for the VFU.

For example, to set up a 12 inch form with a 6 line perforation, skip:-

Rotate the knob to position 14
Press 'Form Feed' (this sets 12" forms length)
Rotate the knob to position 6
Press 'On Line' (this sets 6 line skip)
Return rotary switch to position 0

3. Self Test Mode

Rotate the VFU knob to position 15, close the cover and press 'On Line'. The printer will output its character set in a rotating pattern.

TELETYPE MODEL 43

For normal operation, DATA lamp should be lit.
If Micromax is not ready or not connected, TERM READY should be lit.

Status Lamps:-

LOCAL	(KSR only) offline local keyboard mode
TERM READY	Printer is ready to receive but host computer is not present or not ready.
DATA	Printer is ready and all Interface lines are in their correct states for data reception.
ALARM	Indicates:- * Paper out * Cover off * Printer test mode enabled * An undefined internal malfunction
INTRPT	(KSR only) Not Used

Power Supply - Led visible through Power Supply cooling slots. On indicates power OK.

Controls:-

LOCAL	(KSR only) Places printer in offline local mode
DATA	(KSR only) Enables comms mode if ready.
TERM READY	(KSR only) Enables comms mode if ready.
INTRPT	(KSR only) Clears Interrupt (Not Used)
PRINTER TEST	Causes printer to output its Character set
PARITY	(KSR only) Should be down
DUPLEX	(KSR only) Should be down
CPS	(KSR only) Should be up
RESET	(RO only) Resets all printer functions

RO Version: Switch Settings

Parity	Ignore
Speed	30 C/S

N.E.C. 'SPINWRITER' MODEL 5510 PRINTER

SWITCH SETTINGS

For operation with MicroStar (All models).

1. FRONT PANEL SWITCHES

Some switch settings may vary according to customer's requirements. Generally, switches will be set as follows for normal operation:-

Switch	Setting	Remarks
CLEAR	(mom)	Unconditional reset.
TEST	off *	See self-test instructions
FORM LENGTH	A/R	Default to 66 lines/form (Also, see self-test instructions)
SPEED	H	1200 Baud for MicroStar
	M	300 Baud for Reality
PARITY	M	'Mark' = None
DUPLEX	F	Full-Duplex Mode
LOCAL LF	off *	Host Controls Linefeed
LF	6	6 Lines/Inch Normally Used
SP	12	12 Characters/Inch Spacing Normally Used

Switch	Setting	Remarks
REMOTE/LOCAL	REMOTE	'On Line' Switch. 'Local' allows local form feed
RESET	(mom)*	Resets 'Alarm' Condition. Does not clear print buffer.
FF	(mom)*	Causes form-feed when in 'Local' mode.
SET TOF	(mom)*	When pressed, current paper position will be regarded as being top-of-form.
POWER	A/R*	Note - parallelled by switch on rear panel.

*A/R = As required
mom = Momentary Action (Spring Return)
off = Down Position

2. INTERNAL SWITCHES

a/ DIL Switch on front Panel PCB:-

OFF = Down

Switch	Setting	Remarks
1	OFF	Auto CR disabled
2	ON	Clear all tab stops on command
3	OFF	Break enabled
4	OFF	X-on/X-off disabled
5	OFF	Reverse channel high on 'Ready'.
6	OFF	Normal operation. (Does not lift ribbon to hammer position when on.)
7	ON	Baud rate selection:- L = 110, M = 300
8	ON	H = 1200 on front panel when 7 and 8 are on

b/ DIL switch on G9GLB Processor (PCB Slot 2).

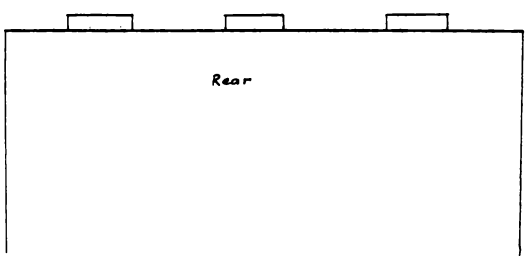
OFF = DOWN

Switch	Setting	Remarks
1	OFF	Hammer enabled (ON allows test w/o hammer firing).
2	ON	Carrier Detect Disabled
3	OFF ON	For keyboard model For no-keyboard model
4	OFF	Driver lock normal
5	OFF	Memory enable
6	OFF	(Reserved by NEC)
7	OFF	(Not used)
8	OFF	(Not used)

MICROMAX I

Port location and designation

	Console	CRT	Printer
Port	0	1	2



RS232 COMMUNICATIONS INTERFACE

1. Format:

   8 bit data field

   1 stop bit

   No parity

2. Communications Port Connections:

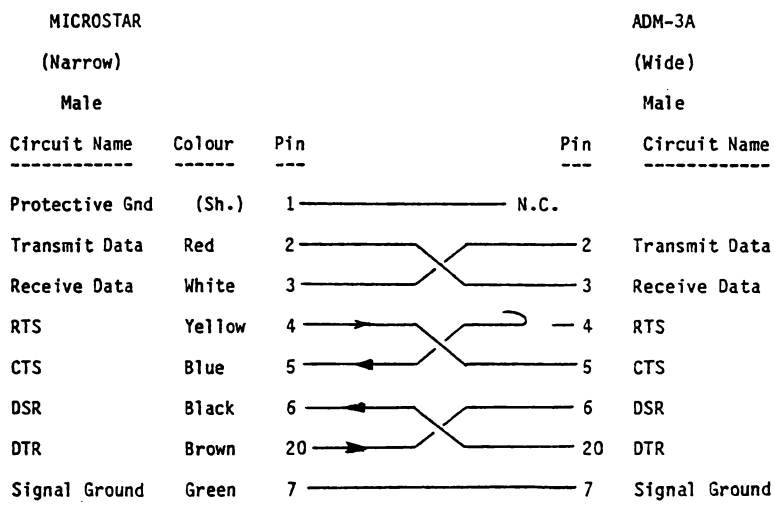
Pin	Function
1	Chassis ground
2	Transmitted Data Data from Micromax is transmitted on this pin.
3	Received Data Data from a peripheral device is received by Micromax on this pin.
4	Request to send Micromax outputs a positive voltage level on this line when it is ready to transmit data. In full-duplex mode, this line is always positive.
5	Clear to send By applying a negative voltage to this pin an external peripheral device can cause Micromax to suspend data transmission. When the pin is returned to a positive voltage state, Micromax recommences transmission precisely where it left off. If no connection is made to this, Micromax will cause it to assume a positive voltage state.

RS232 Continued

6	Data Set Ready By applying a negative voltage to this pin, an external peripheral device will cause Micromax to flag an error type 112 DEVICE NOT READY. The error will be flagged only when the port is accessed by the program. If no connection is made to this pin, Micromax will cause it to assume a positive voltage state.
7	Signal and Chassis Ground This pin is a signal and chassis ground return for the communications interface.
8	Carrier Detect Micromax supplies a + 12V level buffered with 4700 ohms on this pin. It may be used to apply a positive voltage level to peripheral devices which ordinarily require a 'Carrier Detect' signal from a data modem.
20	Data Terminal Ready This output from Micromax is always at a positive voltage level on Video terminal port 0 and 1. On printer port 3, Micromax will maintain this pin at a positive voltage level for 20 seconds after the last print output, and then cause it to go negative. This pin may be used on chain, clutch or drum printers to shut down the print motor and avoid excessive mechanical wear.

Microstar - ADM-3A & *ADM 31* *Refer EB III*

Cable - Hartland WH 753 7 core shielded
- Telcon 71TK7/501 7-core shielded
Length - 5 m
Connectors - 2 x Male:1 - W/8 pins, 1 - W/7 pins
Covers - Yes
Lockscrews - Yes
Labels - Yes



INTERFACE CABLE

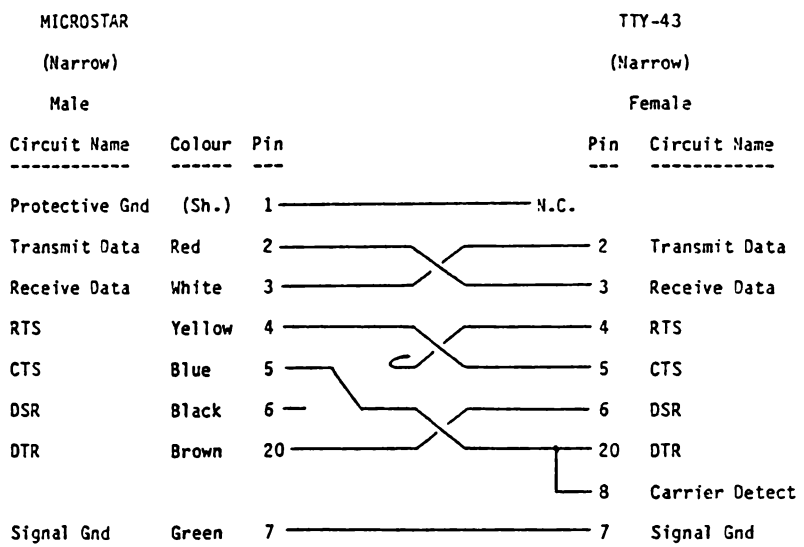
Cable is available from National Store as a Stock item. Length is 5m. Cable is identical to LSI-210.

MICROSTAR (Narrow) Male				LSI - 310 (Wide) Male	
Circuit Name	Colour	Pin		Pin	Circuit Name
Protective Gnd	(Sh)	1	———		N.C.
Transmit Data	Red	2	→	2	Transmit Data
Receive Data	White	3	←	3	Receive Data
RTS	Yellow	4	→	5	CTS
CTS	Blue	5	←	19	BUSY
DSR	Black	6	←	6	DSR
DTR	Brown	20	→	20	DTR
				8	CD
Signal Gnd	Green	7	———	7	Signal Gnd

Microstar - TTY-43

Refer EB 156

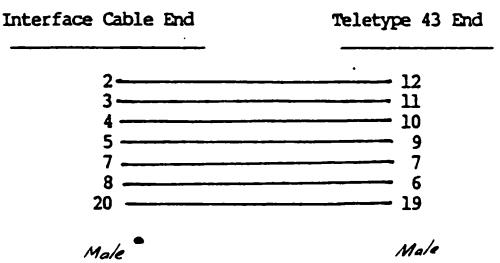
Cable - Hartland WH753 7 core shielded
- Telcon 71TK7/501 7 core shielded
Length - 5 m
Connectors - 1 x Male w/8 pins
1 x Female w/8 pins
Covers - Yes
Lockscrews - Yes
Labels - Yes



Micromax - TTY-43

Unique Patch Cable: for TTY-43 fitted with female connectors instead of male connectors. Refer EB 278

The pin connections of the cable are as follows:-



MICROSTAR-NEC 'SPINWRITER' STUB CABLE WIRING DIAGRAM

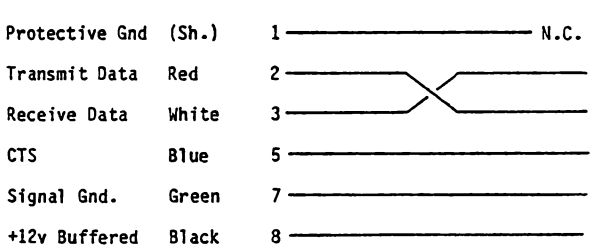
MICROSTAR (Narrow) Male				SPINWRITER (Narrow) Female (Note 1)
Circuit Name	Colour	Pin	Pin	Circuit Name
Prot. Gnd.	(Sh)	1	N.C.	
Tx Data	Red	2	2	Tx Data
Rx Data	White	3	3	Rx Data
CTS	Blue	5	19	BUSY/
DSR	Black	6	20	DTR (Ready)
Sig. Gnd	Green	7	7	Sig. Gnd
+12V Buffered	Brown	8	8	Carrier Detect
			6	DSR
			5	CTS

Note: 1 - Discard lockscrews at female end and fit 17-893 Jacksocket assy.

3. Microstar - Qume

Cable:- Hartland WH753 7 core shielded
- Telcon 71TK7/501 7 core shielded
Length:- 200mm
Connectors:- 1 x Female W/5 pins
1 x Male W/6 pins
Covers:- Yes
Lockscrews:- Male on male connector end
Female on female connector end.
Labels:- Yes

MICROSTAR				QUME	
PORT 2				PRINTER	
(Narrow)				(Narrow)	
Male				Female	
Circuit Name	Colour	Pin	Pin	Circuit Name	
Protective Gnd	(Sh.)	1	N.C.		
Transmit Data	Red	2	2	Transmit Data	
Receive Data	White	3	3	Receive Data	
CTS	Blue	5	4	RTS	
Signal Gnd.	Green	7	7	Signal Gnd.	
+12v Buffered	Black	8	8	Carrier Detect	



TALLY T1602 - MICROSTAR

MICROSTAR (Narrow) Male				T1602 (Narrow) Male
Circuit Name	Colour	Pin	Pin	Circuit Name
Prot. Gnd	(Sh)	1	N.C.	
Trans Data	Red	2	3	Receive Data
CTS	Blue	5	11	BUSY/
DSR	Black	6	20	DTR
Signal Gnd	Green	7	7	Signal Gnd

DIAGNOSTICS

1. FIRMWARE

BD	PROM	
MEM	PROM	
DMA5	PROM	
I/O	PROM	
ADD	PROM	
BANK	PROM	
HALT	PROM	
OUT	PROM	
SOS	PROM	
FDA	PROM	Single Density only
UTD	PROM	Single Density only
VCO	PROM	Double Density only
DBG-S	PROM	Single Density only
DBG-D	PROM	Double Density Only

2. PROGRAMS

Single Density	Double Density	Hard Disk
Staralign MEMT	Staralign MEMT	
XRSIZ		
XRSIZ-1	XRSIZ5	HXRSIZ
STARDOS EXERCISER	STARDOS EXERCISER	STARDOS EXERCISER
STARXEC	STARXEC 2.21	STARXEC 2.21
UTD 1.0		

MEMT - MICROMAX RAM TEST

MEMT is a diagnostic program for testing Micromax's RAM memory. It is loaded from disk into RAM using CP/M. Two versions are available; one for single density machines and one for double density machines.

The program allows the user to select test patterns and pass counts as required. Alternatively, it defaults to a standard test mode consisting of all the available data patterns and an infinite pass count.

The letter P is output to Port 0 to indicate a single pass through the selected pattern or pattern groups.

MEMT is loaded in RAM, starting at location x'0100' and extending to approximately location x'0A00'. The memory diagnostic automatically jumps around these locations in order to prevent MEMT from being over-written by the test data.

To guard against a memory failure within MEMT's RAM area, a CRC is calculated on its code on every pass of the diagnostic. The calculated CRC is compared to a precalculated CRC loaded from disk along with MEMT. An error message is output if a miscompare is found. This method is, of course not foolproof - a memory failure may destroy the program and prevent MEMT from proceeding to a point where it detects a bad CRC and outputs a message. Under these conditions, the system will hang.

RUNNING MEMT

1. Insert the MEMT diskette into drive F0 and boot up. CP/M will sign on and output the prompt: -

   ```
   A>
   ```

2. Enter:-

   MEMT (r)

3. MEMT will sign on and prompt: -

   ```
   MICRO-V RAM MEMORY TESTER
   (A.W.A. VERS. X.X).
   USE DEFAULT TEST OPTIONS?  (Y/N).
   ```

   Answer Y for a continuous test using all data patterns

A 'N' answer will cause the following prompt session:-

ENTER TEST RANGE (ADDR1, ADDR2 OR * FOR ALL OF MEMORY)

You may define the RAM to be tested by entering:-

XXXX,YYYY (r)

where XXXX is the start address
and where YYYY is the end address
- in hexadecimal

- enter '*' to check locations x'0000' to x'FFFF' less the area occupied by MEMT itself

ENTER NUMBER OF PASSES
(1 to 9 or * FOR FOREVER)

-Enter as required

ENTER CODE FOR DATA PATTERN (0-B)

ZEROS	= 0
ONES	= 1
FIVES	= 2
A's	= 3
INCREMENTING	= 4
DECREMENTING	= 5
SHIFTING ZEROS	= 6
SHIFTING ONES	= 7
MSB ADDRESS	= 8
LSB ADDRESS	= 9
ALL OF THE ABOVE	= A
NONE OF THE ABOVE	= B

Enter the code for the pattern required.

If 'B' is answered MEMT will prompt: -

ENTER DATA PATTERN (00-FF)

Enter a test pattern in the range X'00' to X'FF' followed by <Return>.

ENTER CODE FOR ERROR CONTROL (0-3)

PRINT ERROR, CONTINUE = 0
NO PRINT, CONTINUE = 1
PRINT ERROR, RETRY = 2
NO PRINT, RETRY = 3

- Enter your choice.

The diagnostic will commence at this point. For every pass, the letter 'P' will be output.

To terminate the diagnostic, hit ESC. MEMT will output an error summary, return to the beginning, sign on, and repeat the entry prompts.

ERROR MESSAGES

Error messages from MEMT are: -

1. ERROR AAAA XX YY

where AAAA is the address of the data in error
XX is the data written
YY is the data read
- in hexadecimal notation

2. ERROR SUMMARY

ADDRESS	EXPECTED	ACTUAL
AAAA	XX	YY

where AAAA is the address of the data in error
XX is the data written
YY is the data read
- in hexadecimal notation

3. PROGRAM CODE VALIDITY FAILURE

EXPECTED CRC = XXXX
ACTUAL CRC = YYYY

MEMT's calculated CRC did not match the recorded CRC. The program code has been corrupted.

4. STOPPING TEST BECAUSE OF 15 ERRORS

MEMT will automatically print an error summary after this message.

XRSIZ & XRSIZ-1 - MICROMAX MACHINE EXERCISER

This diagnostic program is written in 8085 machine code.
XRSIZ exercises both diskette drives.
XRSIZ-1 exercises only diskette drive F0.
Each diagnostic tests memory.

The control Port is Port 2. Port 0 is used to check the USART DMA output function by transmitting a test message to it under DMA control. Port 1 is configured to echo any characters input to it.

The diagnostic program is loaded into memory from disk, using CP/M. Once in memory it is completely stand-alone. The diskette containing XRSIZ or XRSIZ-1 must be removed after loading as the diagnostic may overwrite any part of the diskette with test data. A scratch diskette should be inserted in each drive.

To run the program proceed as follows:-

1. Insert the diagnostic diskette into drive F0 and bootup. CP/M should sign on a issue the prompt:-

A>

2. Enter the following: -

XRSIZ ↵ or
XRSIZ-1 ↵

Disk activity will be heard and then Port 0 should appear to hang.

The diagnostic program has now been loaded into memory starting at location '0100'.

3. Remove the diskette containing the diagnostic program and for: -

   XRSIZ insert a scratch diskette in each drive
   XRSIZ-1 insert a scratch diskette in drive F0

4. If you do not have another terminal connected to Port 2, move the cable of your terminal from Port 0 to Port 2.

   Hit space bar to start the diagnostic.

5. To terminate the diagnostic hit ESC. XRSIZ will respond with the current count of disk and memory errors. Hitting the space bar again will restart the diagnostic.

MEMORY DIAGNOSTIC

The memory diagnostic writes a pattern into the lower 32K of RAM then loops for about 7 seconds during which time it outputs 10 periods (.) to Port 2. At the end of the loop it verifies that the pattern in RAM has not changed. If the verification cycle is successful, a message is output Port 2: -

XXXX PASSES COMPLETED

- where XXXX is the number of loops of the memory diagnostic that have been completed.

Memory errors are reported in the following format: -

#(location):(data written)>(data read-1st pass)/(data read-2nd pass)

DISK DIAGNOSTIC

The disk diagnostic selects a random track and performs the following operations: -

1. Format
2. Write test data
3. Verify test data
4. Read and compare test data

1. Format

A standard IBM 3740 format is written to all sectors of the current random track. A single-track ID field structure is set up in a RAM buffer and read out under DMA control to the disk controller during the format operation. Refer to the Intel 8271 data sheets for a full description of the ID field structure.

2. Write Test Data

The initialisation routine of XRSIZ sets up a 128 byte RAM buffer with a data pattern decrementing from X'7F' to X'00'. This pattern is written to a random sector on the random track used in the format cycle.

3. Verify Test Data

A verification cycle is performed by the disk controller on the track and sector used in the write cycle. Note that no data transfer takes place during this operation. Only the controller status register is checked upon completion.

4. Read and Compare Test Data

The decrementing data pattern is read from the random track and sector into another 128 byte RAM buffer. A byte by byte comparison of the read and write buffers is performed.

Error Messages

Possible error messages are as follows: -

1. DISK ERROR (error code) ON OPERATION (op code)
   ON TRACK (track number) AND SECTOR (sector number)

   Error Codes: -

   08 Clock error
   0A Late DMA
   0C ID CRC error
   0E Data CRC error

   1 0 Drive Not Ready
   1 2 Write Protect Status
   1 4 Recalibrate error
   1 6 Write Fault
   1 8 Record not found

   Op. Codes: -

   1 = Format
   2 = Write
   3 = Verify
   4 = Read
   5 = Disk Controller Initialisation

2. DISK TRANSFER ERROR AT (RAM buffer location)
   PUT --> (data written)
   GOT --> (data read)
   ON TRACK (track number) AND SECTOR (sector number)

DMA USART CHECK

Whilst XRSIZ is running, the message:-

THE DMA IS WORKING

is output to Port 0. Plugging a terminal into Port 0 will allow visual confirmation of the operation of the DMA.

REAL TIME CLOCK

The real time clock is set up to generate an interrupt at one second intervals during the running of XRSIZ. Every 60 interrupts, a message is output to Port 2 from the RTC interrupt service routine: -

THE TIME IS NOW hh : mm : 00

- where hh : mm are the hours and minutes since the diagnostic was started. This clock is not necessarily accurate as the time period is dependant upon the uncalibrated CPU clock crystal.

At each time message, a memory error report is displayed in the form:-

THERE WERE XXXX MEMORY ERRORS DETECTED

XRSIZ5 - DOUBLE-DENSITY MACHINE EXERCISER

This exerciser/diagnostic is the double-density version of the XRSIZ exerciser written for the WD1791 disk controller. It tests the function of both disk drives, the comms. ports, system memory and DMA channels.

It outputs an error summary to port 0 every minute. Hitting the ESC key on port 0 aborts the exerciser and displays an error summary on port 0. The exerciser can be optioned to generate a hard-copy error summary on a printer attached to port 2.

A resident formatter allows scratch test diskettes to be formatted by the exerciser routine rather than having to have another diskette available with a formatter routine. The formatter is 'doctored' slightly so that it does not overwrite the exerciser itself or its bootstrap loader. (Thus it is not a substitute for the normal formatter in SLOAD).

OPERATION GUIDE

Insert the XRSIZ5 diskette into F0 at the double-density system to be exercised and, optionally, a scratch diskette into F1. Boot up. The sign-on message should appear as follows:-

```
* DOUBLE DENSITY MACHINE EXERCISER * VERSION 5.XX (Date)
```

The following prompt session will occur. You may hit 'ESC' at any time during the session and the exerciser will return to the first prompt and restart.

```
ENTER SURFACES TO BE EXERCISED -   F0 - UPPER = 0
                                     - LOWER = 1
                                   F1 - UPPER = 2
                                     - LOWER = 3
ENTER SURFACES (END WITH C/R) -
```

Enter the numbers corresponding to the surfaces to be exercised one after another in sequence. Enter C/R when all required surfaces have been entered. No delimiters are required between individual surface numbers.

```
ENTER SUMMARY TO PRINTER
```

If required, the error summary may be sent to a printer attached to Port 2 (printer port). Answer 'Y' or 'N' as required.

```
If 'Y' answered to above:-  ENTER PRINTER TYPE -
                                LSI-210/310 (9600 BPS) = L
                                TELETYPE 43 (300 BPS)  = T
```

Select printer type according to type or rate. After selection, the message:-

PRINTER AVAILABLE

- is output to port 2 at the rate selected so that correct printer operation can be verified.

ARE COMMS PORTS TO BE TESTED? (Y/N)

Communications ports 1 and 2 may be tested by looping pin 2 (Tx Data) to pin 3 (Rx Data) for the duration of the test. Test data blocks are output by DMA and received by interrupt response. The data blacks are compared in memory.

Answer 'N' if you do not wish to test the ports. If 'Y' is answered, you will be prompted to insert loopback plugs into ports 1 and 2 (or just port 1 if you elected to use a printer on port 2 for hard-copy error summaries.) Hit C/R after plugs are inserted.

ENTER DRIVE TYPE:- CALDISK = C (6MS STEP)
REMEX = R (3MS STEP)

Select drive type according to brand or step rate.

DISK CONTROLLER IN SINGLE OR DOUBLE DENSITY MODE? (S/D):-

You may operate the double-density controller in double or single density mode. Normally, double-density mode is selected.

ENTER SURFACES WHICH REQUIRE FORMATTING (0-3)
(OR C/R IF NOT REQUIRED)

Enter the surface number of any surface which requires formatting (0 through 3) Only one surface at a time is formatted. Upon entering a surface number, the surface will immediately begin to be formatted. When that surface is complete the prompt will reappear.

When all required surfaces have been formatted, or, if formatting is not required, hit C/R to continue.

Note that you may format your XRSIZ5 diskette without overwriting the XRSIZ5 code or it's bootstrap. The formatter intentionally misses formatting the first three tracks at each side where the code and boot reside.

The exerciser commences at this point with the message:-

NOW COMMENCING EXERCISER

An asterisk is output on each pass of the memory diagnostic.

ERROR SUMMARY

Every minute, an error summary is output to Port 0 in the following format:-

```
* ERROR SUMMARY *

TIME EXERCISER RUNNING - 00:03:00

DISK DATA TRANSFER ERRORS     -   XXXX
DISK STATUS ERRORS            -   XXXX
MEMORY ERRORS                 -   XXXX
PORT 1 LOOPBACK ERRORS        -   XXXX (NOTE 1)
PORT 2 LOOPBACK ERRORS        -   XXXX (NOTE 2)
```

Note 1 - Message displayed only if port tests selected.

Note 2 - Message displayed only if port tests selected and printer not used for error summary printout.

Entering 'ESC' on port 0 will display a full error list on the screen as follows:-

```
* ERROR SUMMARY *
SURFACE     STATUS     T/FER ERRORS     DISK ERRORS     TIMEOUTS     NO. PASSES
   X          XX           XXXX            XXXX           XXXX          XXXX

PORT 1  LOOPBACK ERRORS: XXXX TIMEOUTS: XXXX
PORT 2  LOOPBACK ERRORS: XXXX TIMEOUTS: XXXX
```

Where:-

SURFACE = Surface number on which the error occurred.

STATUS = Accumulated status code returned from WD1791 chip.

T/FER ERRORS = DMA transfer mismatches.

DISK ERRORS = Number of times disk controller failed to respond and had to be restarted.

PASSES = Number of passes of the exerciser which have been completed.

LOOPBACK ERRORS = Part Tx/Rx data miscompares.

TIMEOUT ERRORS = Number of times no response was received on Rx data after data was transmitted.

ERROR MESSAGES

Each time an error is detected, a message is output to port 0. The following formats are used:-

- Disk Error

DISK ERROR - STATUS = SS, TRACK = TT, SECTOR = RR, DRIVE = D, COMMAND = CC.

Where:-

STATUS is 1791 status byte content

TRACK is track number of error

SECTOR is sector number of error

DRIVE is surface number error occurred on

COMMAND is command byte output to 1791 which resulted in the returned error.

- Disk Transfer Error

DISK TRANSFER ERROR ON DRIVE D, TRACK TT, SECTOR RR FF EE

Where - D = Surface on which error occurred.
- TT = Track no. on which error was found
- RR = Sector number on which error was found
- FF = Data found
- EE = Data expected.

- A DMA error is the most likely cause of this problem.

- Drive Not Ready

READY DRIVE AND HIT RETURN

- Port Data Transfer Error:-

PRINTER PORT TRANSFER ERROR

or

PORT 1 TRANSFER ERROR

OUTPUT - OO INPUT - II

Where - OO = Data Output
II = Data Input

- Port Timeout Error:-

TIMEOUT ERROR ON PRINTER PORT

or

TIMEOUT ERROR ON EXTERNAL CRT PORT

RESTARTING PORT TESTS

- This error means that no response was received on port input in response to port output.

- Lost Interrupt:-

MISSED AN INTERRUPT - NOW RESTARTING

An undefined interrupt was lost.

- Memory Error:-

MEMORY ERROR AAAA RR

Where AAAA = Address of error
RR = Data Read

- Disk Controller Timeout

DISK CONTROLLER TIMEOUT - NOW RESTARTING

This is indicative of a bug in the 1791 disk controller chip where it hangs and must be restarted. It causes no practical problems in normal operation since all software is geared to expect this problem occasionally.

Appendix I

ERROR STATUS CODES OF WD1791 DISK CONTROLLER CHIP

(For complete information on WD1791 refer to EB150 of 5/3/80).

The 1791's status bytes change meaning according to the command that was executed which resulted in the error condition. Thus it is necessary to decipher the command type first.

The most significant four bits of the command give the command type as follows:-

TYPE	MS BITS (HEX) OF COMMAND
I	0 to 7
II	8 to C
III	E and F

A fourth type of command, 'Force Interrupt', is not used and not covered here. Refer EB150.

Status for Type I Commands:-

BIT	MEANING
7	Drive Not Ready
6	Write Protect Active
5	Head Loaded
4	Seek Error
3	CRC Error
2	At Track 0
1	Index Pulse
0	Controller Busy Processing Command

Status for Types II and III Commands

BIT	MEANING
7	Drive Not Ready
6	Write Protect Active
5	Write Fault/Record Type
4	Sector Not Found
3	CRC Error
2	DMA Subsystem Lost Data
1	Requesting DMA Service
0	Controller Busy Processing Command

HXRSIZ VERSION 1.2 (PRELIMINARY)

MICROMAX HARD DISK EXERCISER

1. Format routine is not a substitute for 'STARDOS' formatter as it does not write a skeleton directory. It is a diagnostic formatter only.

2. Test Parameters determine the format of the 256 byte sectors which are written to the drive as test data.

3. Error codes are as follows:

   Error code displayed as 1 byte with each bit assigned a meaning as follows:

BIT	STATUS
0	Seek Error - Track not Identified
1	Guard Error (not used)
2	Data CRC Error
3	Header CRC Error
4	Header Not Found
5	Track Flagged as Defective
6	Write Unsafe
7	Drive Unit Fault

4. The Exerciser may be halted at an time by hitting 'ESC'.

DIAGNOSTIC 'UTD'

SUMMARY

This utility checks all sectors on a floppy diskette for errors. On encountering a hard error, the utility allows the data in the sector to be dumped to the terminal or printer.

(Only error types '08' and '0E' have the dump option).

The operator will be prompted for the baud rate of the printer at power-up. If a '9' is entered the baud rate will be set to 9600 baud. The default [CR] is 300 baud and is set if any character other than a '9' is entered.

A diskette may be verified in either drive 0 or drive 1. The operator will be prompted for the drive at power-up. The default is drive 0 for [CR] or any character entered other than one.

Verification is performed on a cylinder basis beginning with side 1 (upper), track 0, sector 1 for the selected drive. After sector 26 of track 0, side 1 is checked, verification continues with track 0, side 0 (lower), sector 1 - 26, then onto track 1, side 1 (upper) sector 1 - 26 and so-on until track 76, side 0 (lower), sector 26.

RUNNING 'UTD'

After bootup the first prompt is:

PB?

Enter: 9 for printer baud rate 9600
3 for printer baud rate 300

The next prompt is:

DR?

Enter: 0 for drive 0
1 for drive 1

RUNNING 'UTD' Continued

The diagnostic commences. When a soft disk error is detected, the following message is issued:

```
S
E

DR SI TR SE EE
99 99 99 99 99  (N.B. All No's are in Hex)
```

Where:

DR = Drive No.
(0 = Right 1 = Left)

SI = Side No.
(0 = Lower 1 = Upper)

TR = Track No.
(0 = First 76 = Last)

SE = Sector No.
(1 = First 26 = Last)

EE = Error No.
(see Page 5 for error codes).

For data-type errors, the diagnostic will retry on the same sector for up to ten times. The following hard disk error message is then issued.

```
H
E


DR SI TR SE EE
99 99 99 99 99
```

When the diagnostic finishes or is aborted the ESC, the following error summary is displayed:

```
S9999
H9999
```

This indicates the count for soft and hard errors.

MICROMAX STARDOS SYSTEM EXERCISER

Introduction:

This diagnostic program is written in STARDOS/BASIC language. Its primary purpose is to exercise a Micromax system over a period of time under actual STARDOS operating conditions. It can be used as a fast go/no go test.

Operation:-

Load the System Exerciser diskette into drive F0.

Optionally, load a second System Exerciser diskette into F1. Alternatively, load a scratch diskette and use the System Utilities to copy the System Exerciser diskette.

Boot up and select option (1) ENTER MASTER MENU. The Exerciser will start running.

The method of halting the diagnostic depends on the revision level of STARDOS being used:

Rev X.3	(a) Hit CTRL-X (b) Switch system off
Rev X.4	Hit CTRL-X only

Description

System Exerciser consists of two nearly identical programs:-

XORC - F0 Exerciser
XOR2 - F1 Exerciser

Both these programs are unlocked (i.e. listable) and are resident in program files that are considerably larger than the programs. Thus, they may be added to or modified, to suit individual purposes.

Auto-Boot file HL01 hands control to XORC on drive F0 immediately after the STARDOS/BASIC system has been loaded.

Upon completion, XORC searches drive F1 for XOR2. If unsuccessful or if drive F1 is not ready, XORC reruns itself. If XOR2 is found, XORC hands control to it.

When XOR2 finishes, it hands control back to XORC on F0 and the cycle repeats.

The programs exercise the system by writing and then reading test data from an indexed sequential file:-

XORC operates on an ISAM file called SHIP

XORC operates on an ISAM file called SHAP

Prior to commencing a diagnostic pass, the test file is cleared by calling utility CLIS as a subroutine (refer to the Stardos Utilities section of the Stardos/Basic Programmer's Reference Manual, for full details on the operation of CLIS).

During one pass, 300 records are written to and read from the ISAM file. The index keys take the following form:-

1st 100 loops: -

XXXXEFGHIJKLMNO

2nd 100 loops: -

ABCDXXXXIJKLMNO

3rd 100 loops: -

ABCDEFGHXXXXMNO

- where XXXX is the current loop count for each of the three groups of 100.

In all three cases, the test data consists of three records, each consisting of the letters A to O inclusive.

CONV - UTILITIES UPGRADE PROGRAM

This program is used to upgrade the STARDOS Utilities of earlier releases of STARDOS. If you are a new MICROSTAR user, upgrading is not applicable and this program may be deleted.

The program is run as follows:

1) RUN 'CONV/dn'

2) The prompts are:

```
THIS PROGRAM INSTALLS UTILITIES ONTO A DRIVE OF YOUR CHOICE.
PRESS RETURN KEY TO CONTINUE
```

After depressing 'CR':

```
WHAT DEVICE CONTAINS THE NEW RELEASE OF UTILITIES?
```

Enter the device in the format: dn

```
WHAT DEVICE DO YOU WISH TO INSTALL THE UTILITIES ONTO?
```

Enter the device in the format: dn

After depressing <CR> the following options are displayed:

```
ENTER "A" TO INSTALL A COPY OF ALL UTILITIES
ENTER "C" TO INSTALL ONLY UTILITIES WHICH HAVE CHANGED
ENTER "E" TO INSTALL ONLY UTILITIES WHICH HAVE CHANGED,
BUT ONLY IF THEY ARE ALREADY PRESENT ON dn.
```

Option A will copy all utilities from dn1 to dn2, overwriting the old versions on dn2. Option C will copy from dn1 to dn2 only the utilities that have changed since the last version of STARDOS, and will overwrite only those old versions on dn2. Option E is like option C except that it will not copy from dn1 to dn2 the utilities that were not previously present on dn2.

```
ENTER "H" TO INSTALL HARD DISK UTILITIES ALSO, OTHERWISE <CR>
```

Option "H" will also transfer the hard disk utilities (program LFSR and Subroutines), provided they match options A, C, E entered previously.

After entering one option, the program displays the name of the program file that is currently deleting, creating and copying. After normal completion, the message "CONVERSION COMPLETE" is displayed.

If for any reason a file is not transferred, a message is displayed and the program will go on with the next file.

CPYR - COPY ONE DISKETTE TO ANOTHER OR HARD DISK AND REORGANISE ISAM FILES

This program is used to generate a reorganised copy of a STARDOS diskette or copy the contents of a diskette to the hard disk. Files will be ordered and reorganised in their most efficient form. ISAM files which have had records deleted, will regain the otherwise lost data space and the whole pad and overflow space is also regained. The diskette to be reorganised is not altered by running the program. The files created in the destination disk will be the same size as the source file. In the case of ISAM files, they will always be created with standard pad and overflow. If a new size or specific pad and overflow is desired, the destination file must be created accordingly, before running CPYR.

This program is run as follows :-

1) A blank destination diskette may be prepared by running the INITIALIZE option of the System Utilities. The diskette may optionally contain the operating system.

2) For any files where it is desired to change the size, pad or overflow, use the CREA utility to create empty files of the required specifications, on the destination disk using the same names as the source files. Do not change parameters such as file type, record size and key size. If CPYR finds no matching filename on the destination disk, it will create a file the same size as the old file.

3) If a source file is an ISAM file with non standard PAD and/or overflow, CPYR will create a standard PAD/OVERFLOW ISAM file, unless one with the same characteristics of the source is created with CREA in the destination disk prior to RUN CPYR.

4) Enter RUN 'CPYR/dn'. The prompts are as follows:

DO YOU WANT TO USE A TABLE FILE? (Y=YES)

By answering yes, you may use a table file to transfer only those files specified in the table. The table must be previously created with utility program LFSR (refer to section 2.23). Only the file names will be considered from the table. If the answer was yes, the next prompt is:

TABLE FILE NAME?	Enter name of table file in the form XXXX/dn.
DEVICE?	Enter dn if not entered above.

Note that the above prompts are displayed for 6.X Version (Double-density/Hard disk) but not for 3.X Version (Single-density).

```
SOURCE DRIVE NAME?                Enter dn.

DESTINATION DRIVE NAME?           Enter dn.

COPIES FROM dn TO dn
HIT RETURN TO CONTINUE
```

Before hitting return you may remove the diskette which contains program CPYR and replace it for the desired one as source or destination, since once CPYR is in core it doesn't need any other programs.

Note that CPYR gives the total versatility to transfer files from single density to double density and vice-versa, and from diskette to hard disk or vice-versa.

CPYR will print each filename on the user's terminal. The following indicators may be appended to a filename to indicate special or irregular conditions. The relevance of any indicators to a particular file should be checked at the completion of the program.

INDICATOR	MEANING
E	File already exists on output device. File will not be recreated. Data is transferred to existing file.
C	Isam file error. File is full, or an attempt to write a duplicate key was made, or the key was the wrong length. Be sure to run CLIS to clear the Isam files in the destination disk, prior to run CPYR.
N	Index file on source device was empty - no data will be transferred.
R	Unable to read file on input device.
W	Unable to write file on output device.
I	Unable to open file on input device.
O	Unable to open file on output device.

It is not possible to chain to CPYR as a subroutine.

UTIL - VARIOUS UTILITIES

This program provides options to list the files on a disk and their descriptions, change (or create) a file description, list the available space on the disk, and change the volume name of a disk.

This program is run as follows :-

1) Enter RUN 'UTIL/dn'

2) The prompts are :-

DEVICE - specify the device to be examined (dn)

A selection list now appears :-

1) LIST DIRECTORY
2) CHANGE FILE DESCRIPTION
3) PRINT AVAILABLE SPACE
4) CHANGE VOLUME ID
5) QUIT

WHAT IS YOUR CHOICE? - Enter program option selection (zero means quit, as does 5).

LIST DEVICE? - (options 1 and 3 only) Enter the name of the device for the file listing. "Q0" specifies the system printer, "X0" or <return> with no device name will list to the users terminal.

FILE NAME - (option 2 only) enter file for which description is being changed.

OLD DESCR = NEW DESCR = - (option 2 only) shows present description and allows operator to enter a new description of up to 25 characters.

OLD ID = NEW ID = - (option 4 only) shows the old volume name and allows operator to enter a new name (0-8 chars.)

The possible error conditions which can arise are :-

1) FILE NOT FOUND - the specified file could not be located on the device specified.

2) NO ROOM IN DIRECTORY - (option 2 only if there was no existing description). There are 180 directory records. No room for one more. Leave it without a description, or move the file to another volume.

3) FILE ERROR X - see the list of error codes in the STARDOS/BASIC Reference manual.

VLST - LIST DISKETTE OR HARD DISK FILE STATISTICS AND AVAILABLE SPACE

This program, lists the volume table of contents on either a video terminal or line printer. It is run by entering:-

1) RUN 'VLST/dn'

2) The prompts are :-

LIST DEVICE? - specify the device the volume list is to be directed to:
Q0 = system printer
<Return> = user's terminal

DRIVE DESIRED - Specify drive name (dn)

ALL FILES (Y/N)? - If answer is "N" or <Return> is pressed, the following prompt will be displayed:

FILE NAME - Enter a file name in the format "XXXX". The statistics on that particular file will be displayed only, and the program will stop.

PRESS RETURN TO CONTINUE - (only if above question "All Files" was answered as "Y", and output was not directed to the system printer) - this occurs between files listed.

- If 'SKIP' is entered, this prompt will be by-passed, until program completes.

AVAILABLE SPACE OUTPUT

Under the heading "TRACK NO." and "TRACKS", the blocks of contiguous whole tracks available are printed. The following example means that there is a block of 10 tracks available starting from track 14, and 25 tracks available starting from track 99:

TRACK NO.	TRACKS
14	10
99	25

Under the heading "ADDRESS" and "SECTORS", the blocks of contiguous available sectors are printed (blocks smaller than one track). The following example means that there are 22 sectors available, starting at track 8, sector 5, and 12 sectors available starting at track 100 sector 15:

ADDRESS	SECTORS
008-05	22
100-15	12

FILE STATISTICS OUTPUT

For each file, the first line shows the file name and description. On a second line the file type and the record length is printed. And on a third line, the extent number, (non contiguous areas of disk assigned to the same file) the starting address in the disk (2-01 means Track 2, Sector 1), the number of available sectors for the file, the number of records used (for direct files all records are shown as used) and the number of sectors already used by the file.

For index files there are two extra lines. One indicates the number of characters in the key, and the number of pad records per sector (blank key-records initially left in each sector, for further key insertion). The other line indicates the starting and current address of the Hierarchy area (only if primary index area exceeds one track), starting and current address of the primary index area, and starting and current address of the overflow area.

LFSR - LOGICAL FILE SAVE/RESTORE
(DOUBLE-DENSITY/HARD-DISK SYSTEMS ONLY)

The program 'LFSR' is used to transfer files from the hard disk to or from a set of floppy diskettes in F1. A diskette in F0 holds program 'LFSR', its subroutines, and a file called '$DIR' which holds the parameters of each file saved along with the location of the file on the backup diskettes.

NOTE:

Notice that the diskette in F0 (called the DIRECTORY diskette) is part of the set of backup diskettes, and a separate DIRECTORY diskette should be kept as part of each file save.

The total number of diskettes required for a file save will depend on the number of files and their sizes. Each diskette will hold approximately 1 megabyte of data. It is a good idea to initialize extra diskettes (using Option 10 of the SYSTEMS UTILITIES MENU) before starting a file save. Once a file save is started, it is not possible to interrupt a file save to initialize more diskettes.

A feature is the capability of adding to an existing file save by starting a file save without specifying that the '$DIR' file be cleared. When this is done, and a file is saved which has already been saved one or more times before, the previous copies will be lost because the entry in the '$DIR' file for that file will be made to point to the most recent copy. Naturally, more diskettes will be required as these files are added to the end of the existing file save. This procedure is not recommended for normal file save because any previous copy of a file being saved is lost from the set of backup diskettes.

An option for saves and restores is the use of a table file to specify that a subset of all files be used. A table file is an ISAM file with key length of 4, and record length of 14. The keys are the names of files which are to be saved or restored. The fields may specify replacement file parameters which the restore process will use when restoring the file (see description of the TABLE FILE structure).

A set of subroutines in the 'LFSR' program serves to maintain table files. Table files can be created, and file names can be added or deleted. Parameters which can be specified to be changed are record lengths, number of records, key length, pad and overflow allocation. Table files can also be used by the 'CPYR' (Copy and Reorganize) program.

The logical file save and restore assume a sequence of diskettes in F1. The save writes a sequential number and a label on each backup diskette. A date, or any other information, can be made part of the label. The restore checks each diskette for the correct number and label to prevent accidental mix-ups. The '$DIR' file in F0 also has a record containing the label so that it cannot be used with the wrong set of diskettes. Note that no checking of numbers is done on diskettes during the file save. It is the operators responsibility to assure that the diskettes used to save files on do not contain data of importance. Other subroutines in the 'LFSR' program allow listing the contents of the backup diskettes, of the hard disk itself, and of any table file.

NOTE:

When using 'LFSR', your system should be configured to only one user using all memory with 8000 bytes of general use space required. This should be done before entering STARDOS BASIC. When your system is not configured this way, 'LFSR' may give an Error 250 (out of Memory Error) and data being saved to or from the hard disk will be incomplete.

OPERATING PROGRAM 'LFSR'

In order to run the 'LFSR' program, choose Option 1) ENTER MASTER MENU in order to load STARDOS BASIC. When the asterisk (*) appears on the CRT, key in RUN 'LFSR/F0'. The following menu will be displayed on the CRT:

```
1)  CHANGE DATE
2)  LIST BACKUP DIRECTORY
3)  LIST HARD DISK DIRECTORY
4)  SAVE FILE(S) TO BACKUP DISKETTES
5)  RESTORE FILE(S) FROM BACKUP DISKETTES
6)  ADD FILE NAME(S) TO TABLE FILE
7)  DELETE FILE NAME(S) FROM TABLE FILE
8)  LIST CONTENTS OF A TABLE FILE
9)  TERMINATE

SELECT:
```

Option 1) - CHANGE DATE

After selection Option 1, you will be prompted for the present date as follows:

INPUT TODAY'S DATE: (DDMMYY)

Input a 6 digit date and depress 'RETURN' key.

Example : 3rd of August, 1979
Would be entered as : 030879

The above is only a suggested way of entering the date. Select the form that you find most useful. The only limitation, as stated, is that the date must be in 6 numeric digits.

Option 2) - LIST BACKUP DIRECTORY

This option will list each file for which there is an entry in the '$DIR' file. These entries reflect the current contents of the backup volume.

After choosing Option 2, the CRT will display:

LIST DEVICE: _

You may default to device 'X0' (users CRT) by depressing the 'RETURN' key, or you may enter any of the following:

X0 or /X0	output to be directed to CRT
Q0 or /Q0	output to be directed to the Printer

After entering one choice from above, a listing of the directory will ensue.

The column headings are as follows:

NAME:	4 letter file name
TYPE:	File type: P = Program file S = Sequential file D = Direct file I = ISAM file
RRN:	Record number on backup diskettes where file is located
NO. OF RECORDS:	This is the number of records contained in the file on the backup volume
RECORD SIZE:	Size of records on backup volume
KEY SIZE:	Number of characters in key (ISAM files only)
USER NUMBER:	User identifying number
DESC:	File description

Option 3) - LIST HARD DISK DIRECTORY

This option is similar to command 2 except that it lists the directory of the hard disk.

Option 4) - SAVE FILE(S) TO BACKUP DISKETTES

This is the main file save subroutine. The following prompts will be displayed on the CRT, only if the directory file $DIR already contains some file names:

DO YOU WISH TO ADD THESE FILES TO THE EXISTING BACK-UP FILES? (Y/N)

If the answer is "Y" it will go to the next prompt. However, the answer will normally be "N" and the message NOW INITIALIZING BACK-UP will be displayed while the directory file $DIR/F0 is cleared.

BACKUP LABEL:

Enter any string containing for instance the date and any relevant information on the files that will be saved.

DO YOU WANT TO USE A TABLE FILE? (Y/N)

If the response was 'Y' for yes, the prompt will be for the table file name. If 'Y' was keyed in by mistake, depress the 'ESC' key and the CRT will display the Main Menu. The table file must be on drive F0, which is the directory diskette.

If the response was 'N' for no, meaning no table file was desired, then the CRT will display the following prompt:

FILE TO SAVE? (CR FOR ALL, ESC TO QUIT)

The file name must be from 1 to 4 characters and may have imbedded question marks. These question marks are 'wild cards' and match any character in the position it is placed. For example, if 'A???' is entered for the file name to save, then all files that begin with the letter 'A' will be saved. Note that spaces also satisfy the 'wild card' position. By keying in '????' or depressing 'RETURN' all files will be saved. After program 'LFSR' has saved the requested files, the CRT will display another prompt for FILE TO SAVE. At this point, enter the name of another file to save or depress the 'ESC' key to return to the Main Menu. During this save routine, the CRT will display prompts for diskettes to be placed in drive F1 (left drive) as follows:

PLACE DISKETTE #0001 IN DRIVE F1 - THEN PRESS RETURN

It is highly recommended that each diskette be labelled with a diskette number, label and date.

Option 5) - RESTORE FILE(S) FROM BACKUP DISKETTE

This subroutine copies some or all files from a set of backup diskettes onto the hard disk drive. If the file being restored already exists on the hard disk then program 'LFSR' will not create it again, but it will still copy the data off the backup diskettes into the existing file.

To change a file size, a table file must be used, provided that the file does not already exist in the hard disk. Use the sub-routines for creating table files and maintaining table files (Options 6, 7 and 8) to do this. If the desired number of records in the file on the hard disk drive is smaller than in the file being restored, then program 'LFSR' will stop restoring records when the file becomes full. The restore will then advance to the next file to be restored. If the file is an ISAM file, then a 'C' will be printed, otherwise a 'W' error will be printed. Furthermore, if the new record length is less than the old record length, then each record will be truncated at the new length when it is restored. ISAM key lengths may also be changed. If the length is shortened, then the key is truncated. Note that this may cause duplicate keys and cause a 'C' error (see error descriptions). If the length is made longer then the key will have spaces added to the end of it. This may be changed if the key must be expanded with other characters.

To change this, first load the file by keying in:

```
LOAD 'L001/F0'
LIST

1000 K$ = ( K$ + SPC$(28)  ) [ 1,K1% ] : RETURN
```

Change line 1000 to conform to the way you want to restore the key. K$ is the original key, K1% is the new key length. The length of K$ must be the same as K1% on exit or a 'C' error will result. You may use lines 1000 on. Note that this is a subroutine and must have the RETURN. After the proper changes have been made, SAVE the file by keying in:

```
SAVE 'L001/F0'
```

Option 6) - ADD FILE NAME(S) TO TABLE FILE

When Option 6 is selected, the CRT will display a prompt for the table file name. If the table file does not exist then it may optionally be created. (The table file name must be in the format XXXX without specifying drive name, as it is created always in F0). Note: After creating the table file program 'LFSR' will return to the main menu.

After 'LFSR' has located the table file, it will prompt you for the file name to enter. This will be the key in the table file, and will be used as the name of the file to be copied by either program 'LFSR' or 'CPYR'. 'LFSR' will also prompt for the number of records, the record size, pad and overflow. If you do not wish to change these parameters, then enter a 0 (zero). Note that the last three parameters apply only to ISAM files. A zero should be entered on these last three parameters if the file is not an ISAM file. When entering of the file names has been completed, depress the 'ESC' key in response to the prompt for the file name to enter.

Option 7) - DELETE FILE NAME(S) FROM TABLE FILE

Program 'LFSR' will prompt for the table file name as in Option 6. After program 'LFSR' has located the table file, the prompt will be for the file name to delete. Program 'LFSR' will display on the CRT the following:

FILE NAME DOES NOT EXIST
or
FILE NAME ERASED

When finished deleting file names, depress 'ESC' in response to the file name to delete.

Option 8) - LIST TABLE FILE NAMES

When Option 8 is chosen, the display on the CRT will be for the table file name. After entering the name, the prompt will be for the list device (CRT or Printer). After locating the table file, program 'LFSR' will list the entries and their parameters on the specified list device.

Option 9) - TERMINATE

This option terminates (ends) the 'LFSR' utility.

ERROR CODES FOR PROGRAM 'LFSR'

During a file save or file restore, program 'LFSR' may type an error code after the file name. There are two types of errors:

1 - fatal errors (these errors cause the copy to abort and LFSR will continue with the next file); and

2 - warnings (these errors tell the user about an error that could cause a problem, a warning does not abort the copy of a file).

FATAL ERRORS

W - Write error - error in writing to the destination file.

C - ISAM file error - ISAM file is full or an attempt to add a duplicate key was made, or the key was the wrong length.

R - Read error - error in reading from the source file.

O n File created error - n corresponds to the error number given by the utility 'CREA'.

WARNINGS

E File already exists

N File is empty

LFSR DIRECTORY FILE LAYOUT

```
          Number of Records      =  1000
          Key Length             =     4
          Record Length          =    58

Key =     b$ST   (b = BLANK)

Record:         6 BYTES          R9   = Next Available Backup Record
          1 to 128 BYTES         D0$  = Backup Label
                6 BYTES          D1$  = Last Date Updated
```

The b$ST entry is always the first entry in the DIRECTORY file. The layout for the remaining records is as follows:

```
Key =     File Name
Record:         1 BYTE           T9$  = File Type
                6 BYTES          R9   = Record Number on Backup
                6 BYTES          N9   = Number of Records on Backup
                2 BYTES          N9%  = Number of Records in File
                2 BYTES          S9%  = Record Size
                2 BYTES          K9%  = Key Size (ISAM file only)
                2 BYTES          U9%  = User Number
               30 BYTES          D9$  = Description
```

TABLE FILE LAYOUT

```
          Number of Records      =  200
          Key Length             =    4
          Record Length          =   14

Key =     File Name
Record:         2 BYTES          N9% = Number of Records
                2 BYTES          S9% = Record Size
                2 BYTES          K9% = Key Length
                2 BYTES          P9% = Pad
                2 BYTES          O9% = Overflow
```

RECONFIGURE

This routine allows certain system parameters to be changed. A sequence of prompts occurs as follows :-

1) DO YOU WANT INTRINSIC FUNCTIONS INCLUDED (Y/N)?

By answering 'Y' the intrinsic mathematic functions (except INT which is standard) will be loaded, occupying some 3K of extra memory.

This prompt does not apply to Version 3.X (single density) where a MATH version and a NO-MATH version exist. (INT is not included in NO-MATH version).

2)
0 - ADM 3A
1 - ADM 31
2 - VTE-6/R
3 - OTHER

SELECT CRT —— HIT RETURN TO SKIP

Enter the number corresponding to the type of terminal you are using. The appropriate screen clear and cursor control functions for that terminal are entered into STARDOS's configuration table. Carriage return by itself leaves the current terminal configuration unchanged.

3) (X) STEP RATE : 3 FOR REMEX, 6 FOR CALDISK DRIVES

The above sets the rate at which the floppy disk drives seek from one track to the next. (X) = current step rate of the system. If the step rate is not set properly for the system, choose either (3) or (6) depending on the type of drives on the system.

4) MEMORY SIZE (HIT RETURN TO USE ALL MEMORY) -

The normal response is to press the 'RETURN' key to use all the memory available.

5) GENERAL USE SPACE REQUIRED -

Space required for file control blocks. Normally, enter 2000 for single density sytems and 4000 for double density. If application programs open unusually large number of files, this number may have to be increased. The figure 2000/4000 is sufficient for most programs supplied by A.W.A. Flexitex Word Processor needs 1000/2000, and LFSR utility needs 8000.

6) PRINTER BAUD RATE -

Acceptable responses are:- 19200, 9600, 4800, 2400, 1200, 600, 300 and 150. The printer port (port 2) will be set to this rate. Do not use commas within the responses.

7) REMOTE CRT BAUD RATE -

Acceptable responses are:- 19200, 9600, 4800, 2400, 1200, 600, 300 and 150. Port 1 and 2 (if configured) will be set to this rate. In early versions of MicroStar, Port 0 is also set to this rate, but in late versions the baud rate of Port 0 is set by internal configuration.

8) NUMBER OF HARD DISK DRIVES (0/1)

Answer with 1 only if a hard disk is present, otherwise answer with a 0. Note that a wrong answer will cause unpredictable results in the device connected to port 2.

This prompt does not apply to Stardos version 3.X (Single Density Systems).

9) DO YOU WANT A BACKGROUND PROCESS (Y/N)? -

An answer of 'N' will lead to the next prompt number 10. A 'Y' response will cause memory space to be reserved for a phantom process which has no associated port. Also, the following prompts will occur:-

9a) MEMORY REQUIRED FOR THIS PROCESS -

Enter some amount up to the number of bytes left to allocate. Do not use commas.

9b) PRIORITY FOR THIS PROCESS (255 HIGHEST; 1 LOWEST) -

This establishes a relative throughput for this process relative to other processes which may be running at the same time in multi-user configuration.

10) DO YOU WISH TO USE THE PRINTER PORT AS A USER (Y/N)? -

A 'N' response leads to prompt number 11, in which case the system printer (logical device Q0) can be connected to port 2.

A 'Y' response causes memory space to be allocated for a user on port 2. No system printer can be attached, and Q0 becomes an illegal logical device. This response is given when configuring a 3 user system. The following prompts will follow :

10a) MEMORY REQUIRED FOR THIS PROCESS

10b) PRIORITY FOR THIS PROCESS (255 HIGHEST; 1 LOWEST) -

11) DO YOU WISH TO USE THE REMOTE CRT PORT AS A USER (Y/N)? -

An 'N' response leads to prompt 12. A 'Y' response causes memory to be reserved for a user running on the center port (port 1). This response is used for 2 or 3 user configurations. The following prompts will follow:

11a) MEMORY REQUIRED FOR THIS PROCESS -

11b) PRIORITY FOR THIS PROCESS (255 HIGHEST; 1 LOWEST) -

12) CONSOLE HAS nnnn BYTES OF MEMORY> IS THIS OK (Y/N)? -

A response of 'N' will cause the configurator to return all the way back to prompt 4 so that an improved allocation of memory among users can be entered.

A response of 'Y' will lead to the following prompt. Notice that the console port is always assigned as a user and a minimum of 1000 bytes is always reserved for it :

12a) PRIORITY FOR THIS PROCESS (255 HIGHEST; 1 LOWEST) -

13) DO YOU WANT THIS CONFIGURATION RECORDED ON THE DISKETTE (Y/N)? -

A response of 'N' will simply cause the operating system to be entered and the configuration just entered will only be present until the system is booted again. A response of 'Y' will also cause the entered configuration data to be recorded on the diskette in drive F0. The next time that option 1, ENTER MASTER MENU is selected with this diskette, the system will be automatically configured in accordance with the parameters just entered.

INITIALIZE HARD DISK

This option formats all surfaces of the hard disk and places an empty directory on it. This option takes approximately 30 minutes for a 16 megabyte system.

After choosing option 7 the CRT display will be:

NOTE: THIS FUNCTION DESTROYS ALL DATA PRESENTLY ON THE HARD DISK. IS THIS WHAT YOU WANT TO DO? (YN)

If the answer is "N" the system will return to the System Utility Master Menu. Otherwise, the CRT display will be:

FORMATTING DRIVE

After approximately 1 minute, the CRT display will be:

NOW INITIALIZING TRACK xxxx

The track number in the display will be updated from 0 through 835. At this point, the disk initialization is completed, and the SYSTEM UTILITIES MENU will be displayed again.

If during the initialization a bad track is detected, in the hard disk, the following message will be displayed:

BAD SECTOR FOUND ON TRACK XX,
NOW FORMATTING ALTERNATE TRACK.

The bad track will be flagged as such and will point to the address of the alternate track. Any attempt to access the bad track afterwards, will automatically access the alternate track instead.

BINARY BACKUP FROM HARD DISK

This option starts a high speed transfer of the total contents of the hard disk drive to floppy diskettes. The operator is prompted to place diskettes in the floppy drives in sequence. 17 diskettes will be required to back up a 16 megabyte hard disk. It is recommended that the operator label the diskettes to be used with a unique label, the current date, and each with a sequential number from 1 to 17. Odd numbered diskettes will be placed in drive F1. Even numbered diskettes will be placed in drive F0. The diskettes will be saved in pairs, except for diskette 1 (accounting for the odd number of diskettes). The first prompt is:

```
LABEL:_
```

Up to 127 characters may be entered for the LABEL which is then used as the identifier for the series of backups. A RETURN response gives a null label.

A series of messages occurs to prompt for the diskettes to be entered:

```
INSERT DISKETTE #0001 INTO DRIVE F1 (LEFT) - THEN PRESS RETURN
```

depress 'RETURN' key when ready to commence copying.

```
NOW FORMATTING SIDE 0
NOW VERIFYING FORMAT ON SIDE 0
NOW FORMATTING SIDE 1
NOW VERIFYING FORMAT ON SIDE 1
NOW BACKING UP HARD DISK TO DRIVE F1
INSERT DISKETTE #0002 INTO DRIVE F0 (RIGHT), AND
INSERT DISKETTE #0003 INTO DRIVE F1 (LEFT) - THEN PRESS RETURN
```

depress 'RETURN' key when ready to commence copying

```
NOW FORMATTING SIDE 0
NOW VERIFYING FORMAT ON SIDE 0
NOW FORMATTING SIDE 1
NOW VERIFYING FORMAT ON SIDE 1
NOW FORMATTING SIDE 0
NOW VERIFYING FORMAT ON SIDE 0
NOW FORMATTING SIDE 1
```

```
NOW VERIFYING FORMAT ON SIDE 1
NOW BACKING UP HARD DISK TO F0
NOW BACKING UP HARD DISK TO F1
.
.
.
INSERT DISKETTE #0016 INTO DRIVE F0 (RIGHT), AND
INSERT DISKETTE #0017 INTO DRIVE F1 (LEFT) - THEN PRESS RETURN
```

depress 'RETURN' key when ready to commence copying

As each pair of diskettes is filled, a similar prompt for the next pair of diskettes will occur. It is not necessary to first initialize the diskettes because this will be done by the binary save.

BINARY FILE RESTORE TO HARD DISK

This option starts a high speed transfer off of a set of diskettes onto the hard disk drive. These must be diskettes created with the binary file save. All previous contents of the hard disk will be lost. First, diskette 1 will be restored from F1. Then pairs of diskettes in F0 and F1 will be restored.

NOTE:

The odd numbered diskettes go in the odd numbered drive (F1), and the even numbered diskettes go in the even drive (F0). The CRT will display prompts for diskettes in sequence starting with diskette number 1 as follows:

INSERT DISKETTE #0001 DRIVE F1 (LEFT) - THEN PRESS RETURN

The next, and successive messages will be for pairs of diskettes:

INSERT DISKETTE #0002 INTO DRIVE F0 (RIGHT), AND
INSERT DISKETTE #0003 INTO DRIVE F1 (LEFT) - THEN PRESS RETURN

depress 'RETURN' key when ready to commence restore
.
.
.

After completion of the binary restore, the SYSTEM UTILITIES MENU will be displayed. The label is read off of diskette 1 when the restore starts. This label is checked on every following diskette to avoid mix-ups. Also, the diskette number is checked on every diskette.

INITIALIZE DISKETTE FOR LFSR PROGRAM

This option formats a diskette in drive F1 and initializes it for use in drive F1 in the logical file save/restore process. This operation should be repeated on every diskette to be used in drive F1 before starting program 'LFSR' to do the logical file save. Diskettes so initialized will not be capable of holding normal files under STARDOS. This option does not apply to the diskette to be used in drive F0 during the logical file save. That diskette is usually make by copying (using Option 3) a prototype DIRECTORY diskette. If any error messages appear during this process, do not use the diskette in the logical file save. The SYSTEM UTILITIES MENU will be displayed on the CRT after each use of this option.

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